



Max Tool Temp (degF) / Source	167.97 / PCM	212.92 / PCM	239.54 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 167.97	N/A @ 212.92	N/A @ 239.54		
Lead MWD Engineer	Clay Wass	Clay Wass	Clay Wass		
Customer Representative	Merle Lemkule	Dalton King	Dalton King		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11404299	12310746	12310746		
Insert Serial Number	11400838	11680725	11055831		
Date and Time Initialized	13-Dec-14 16:29	12-Feb-15 07:36	15-Feb-15 13:39		
Date and Time Read	16-Dec-14 15:29	15-Feb-15 18:59	20-Feb-15 00:38		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	44.39	43.00	42.00		
Software Version	6.21	6.33	6.21		
Sub Serial Number	11404299	12310746	12310746		
Sonde Serial Number	12174339	11297491	11297516		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	19.26	222.48	254.37		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.35	45.65	45.57		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404299	12310746	12310746		
Insert/Sonde Serial Number	11680971	11293376	11680902		

## REMARKS

1. All depths are true vertical depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.
4. all data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:
 

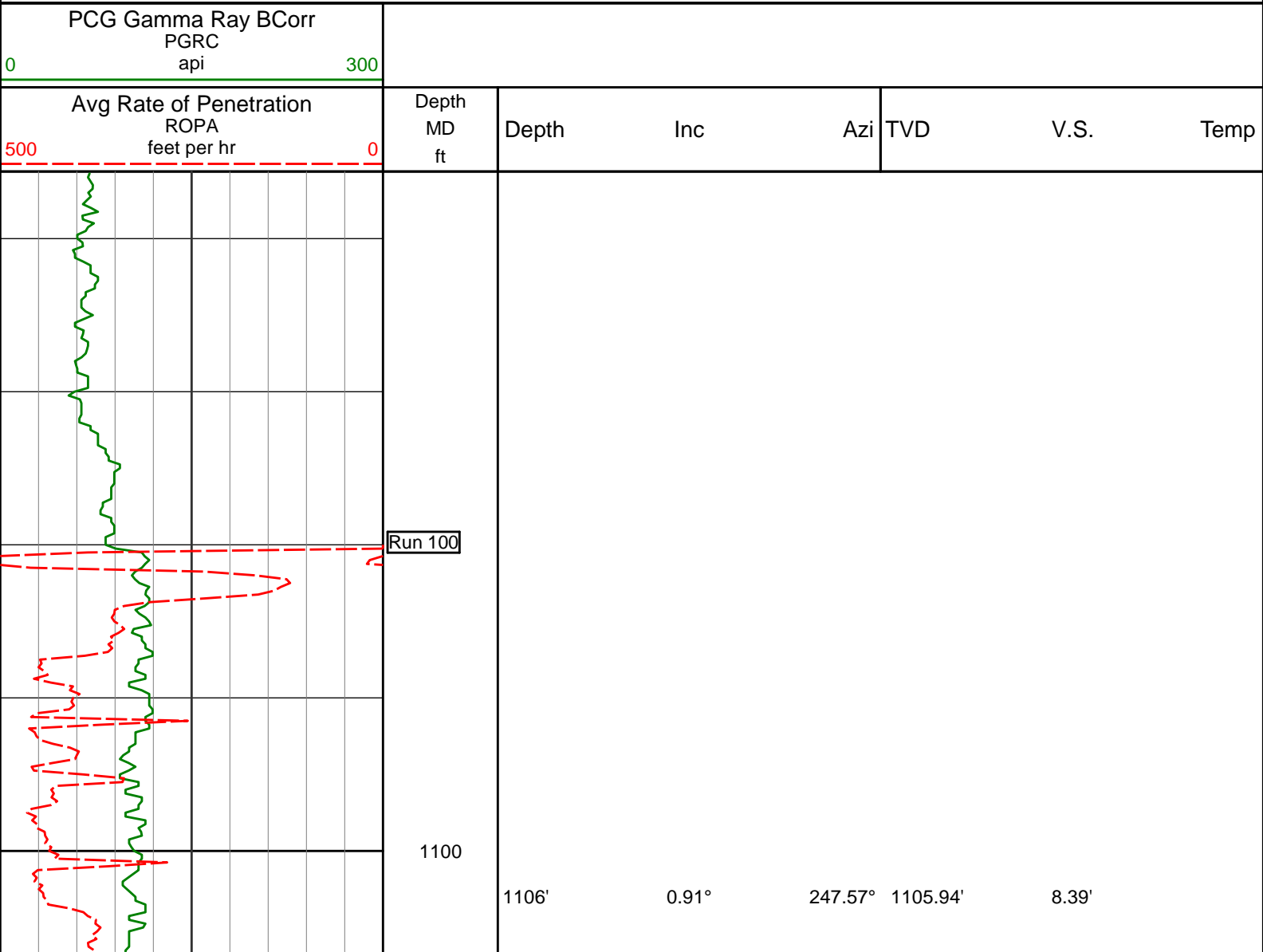
PGRC (Corrected Gamma Ray):  
     Interval Resolution: 0.5 ft  
     Interval Distance: 0.6 ft  
     Gap Fill: 3.0 ft  
  
 ROPA (Average Rate of Penetration):  
     Interval Resolution: 0.5 ft  
     Interval Distance: 1.2 ft  
     Gap Fill: 3.0 ft

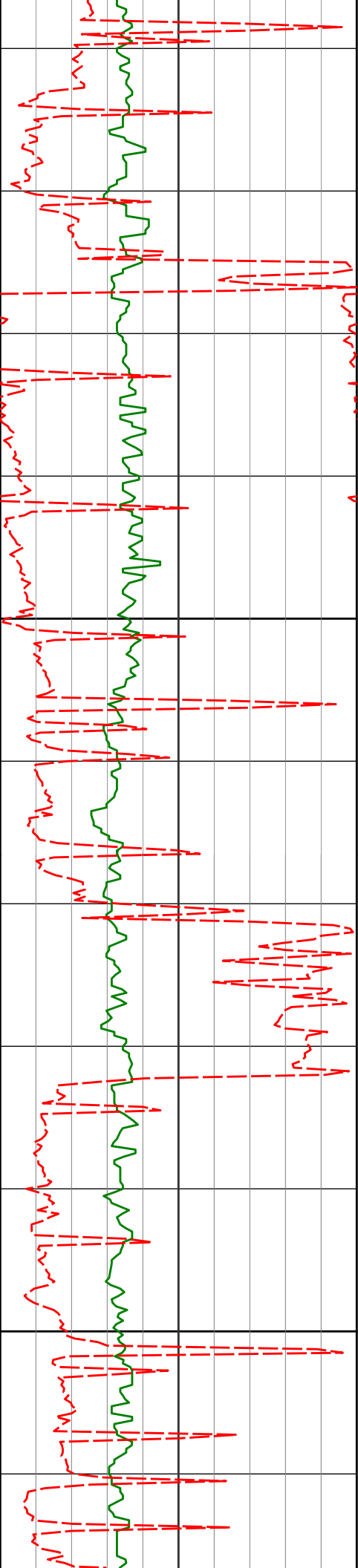
Insite version: 8.1.10

WARRANTY

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MD Detail 1:240 Scale





1200

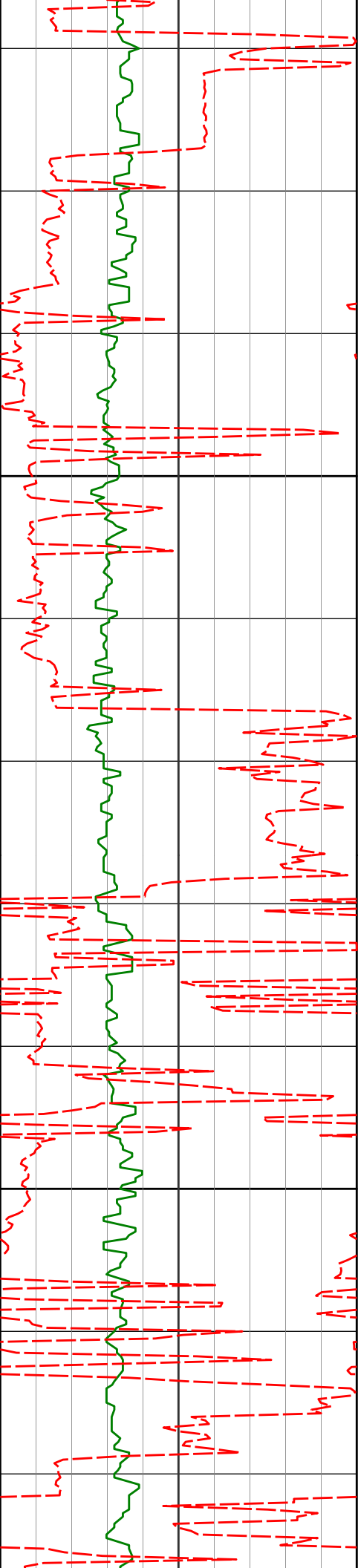
1300

1296'

0.44°

168.95° 1295.93'

9.69'



1400

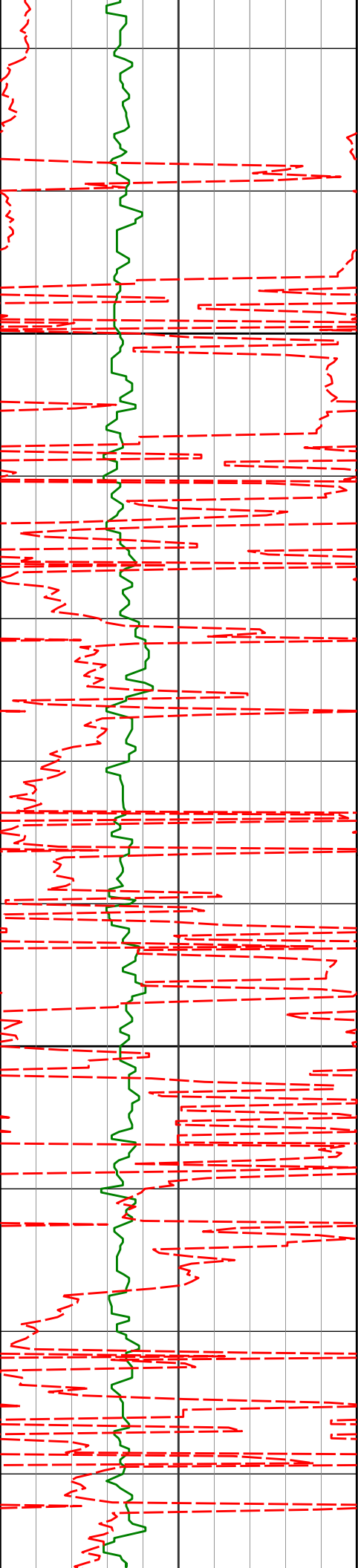
1485'

0.62°

265.93° 1484.92'

10.48'

1500



1600

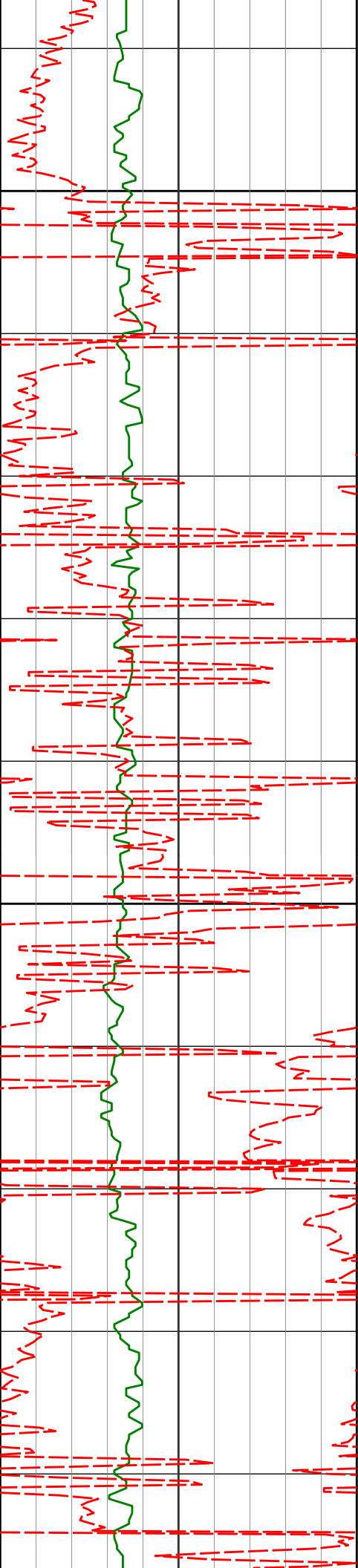
1670'

1.08°

286.91° 1669.90'

10.06'

1700



1800

1853'

0.53°

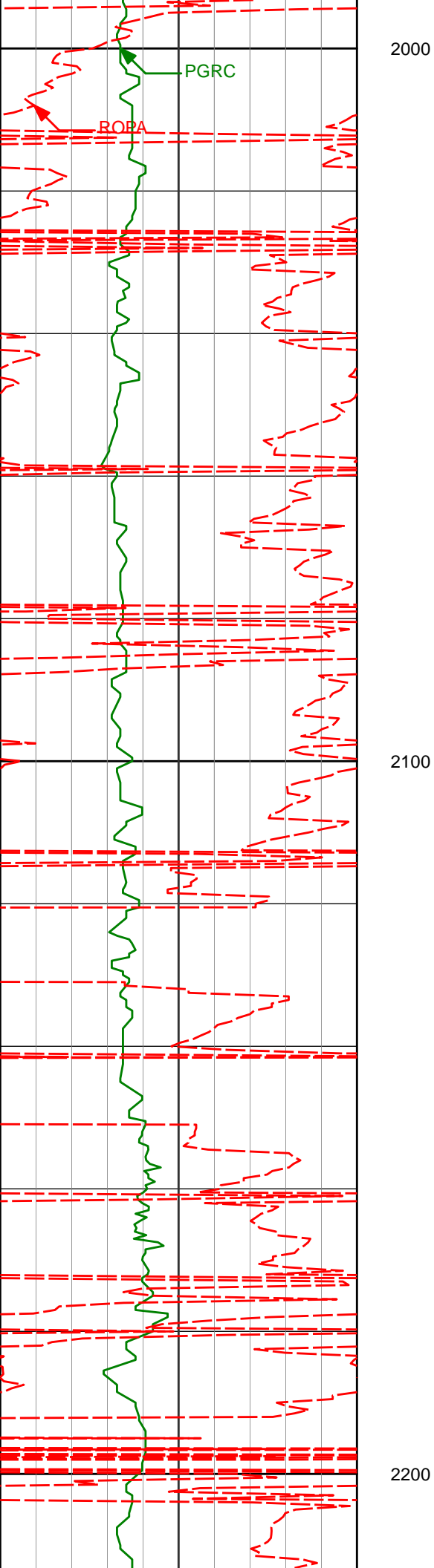
319.47°

1852.88'

8.92'

1900

1950

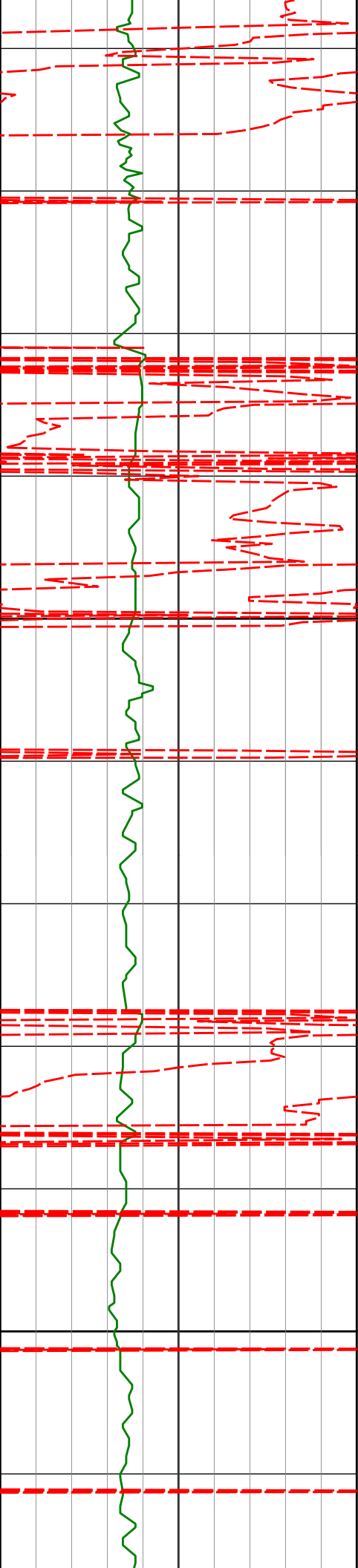


1.02°

289.22° 2035.87'

7.75'





2219'

1.24°

263.59° 2218.83'

7.45'

2300

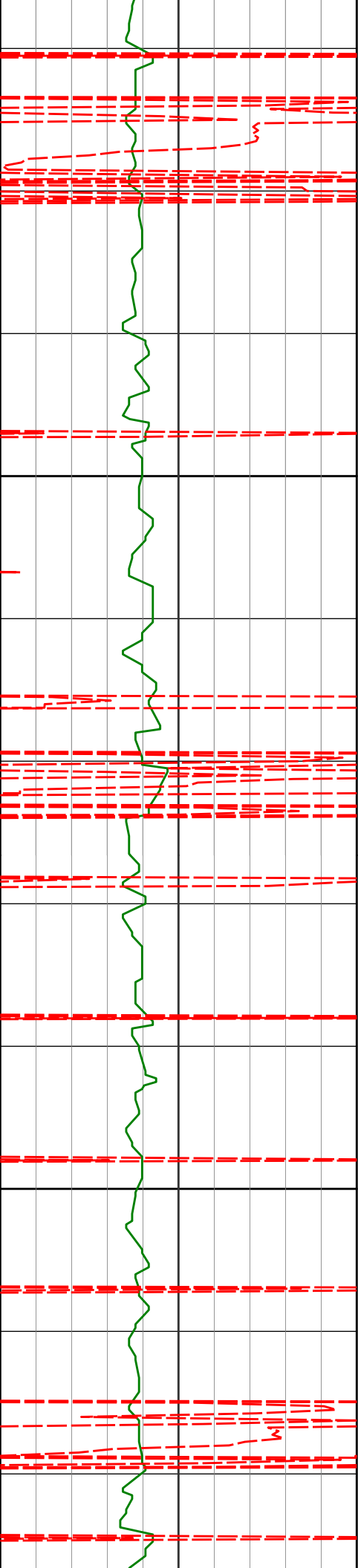
2400

2402'

1.82°

166.26° 2401.79'

10.50'



2500

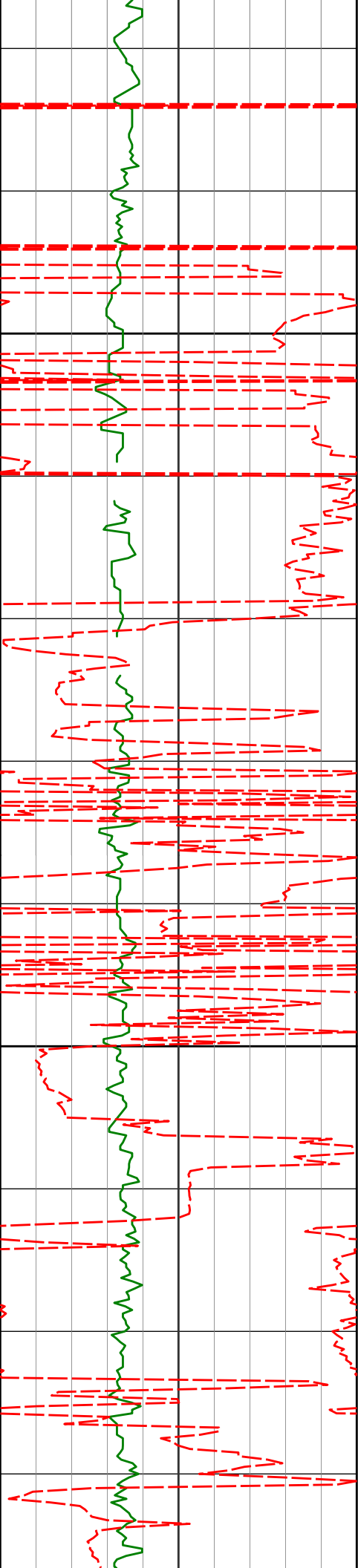
2586'

1.98°

170.69° 2585.69'

16.47'

2600



2700

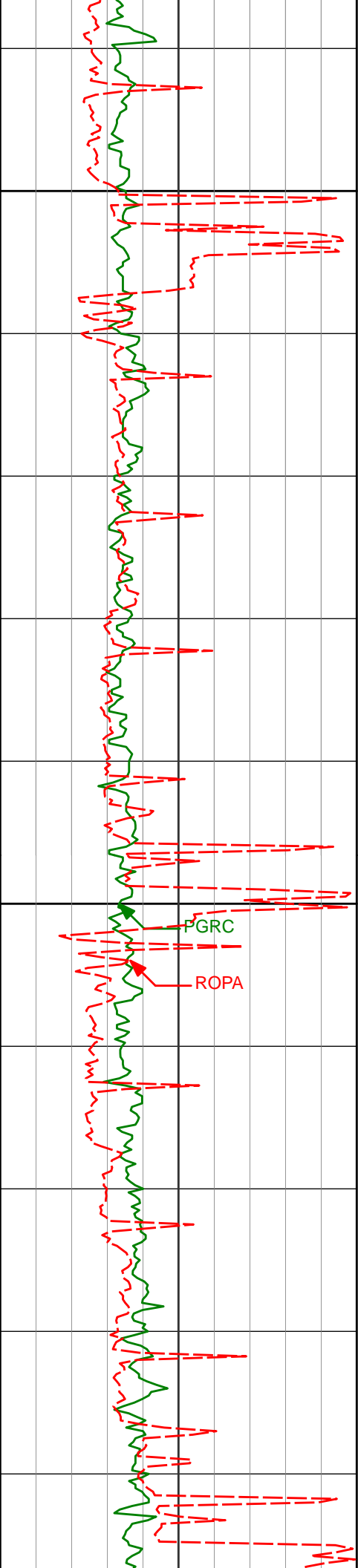
2769'

0.90°

213.04° 2768.63'

20.80'

2800



2900

2952'

0.85°

227.08°

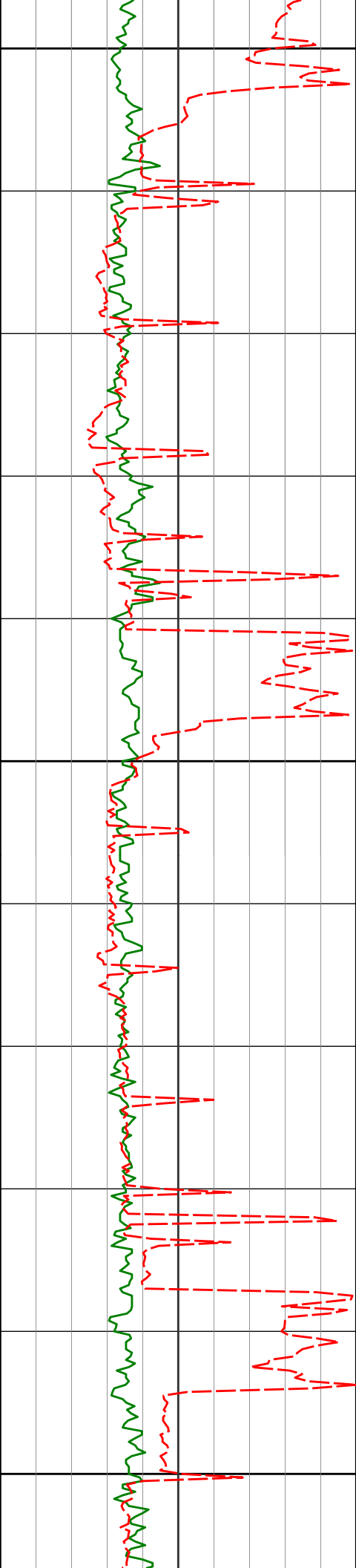
2951.61'

22.94'

3000

PGRC

ROPA



3100

3136'

3.07°

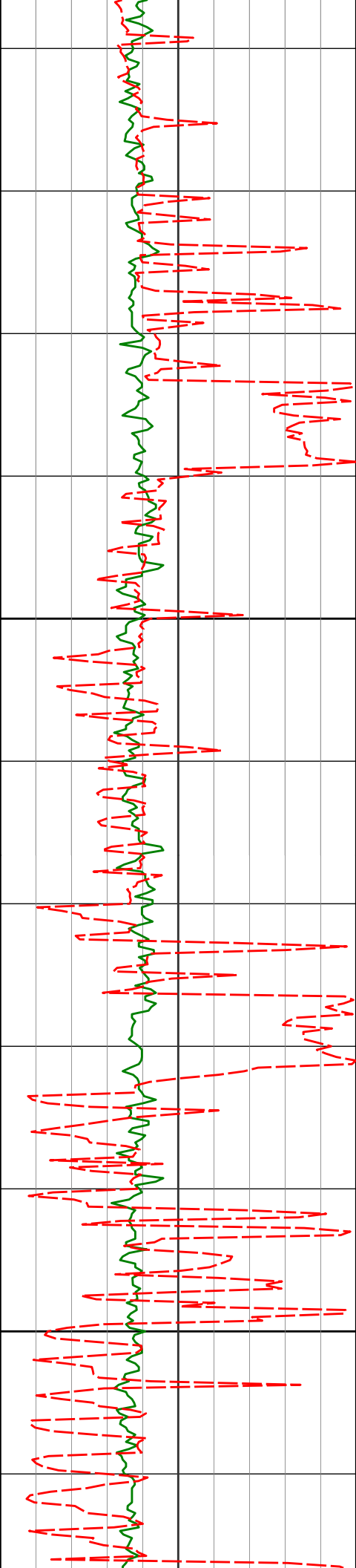
270.19°

3135.50'

23.88'

3200

3300



3400

3500

3318'

5.90°

275.13° 3316.92'

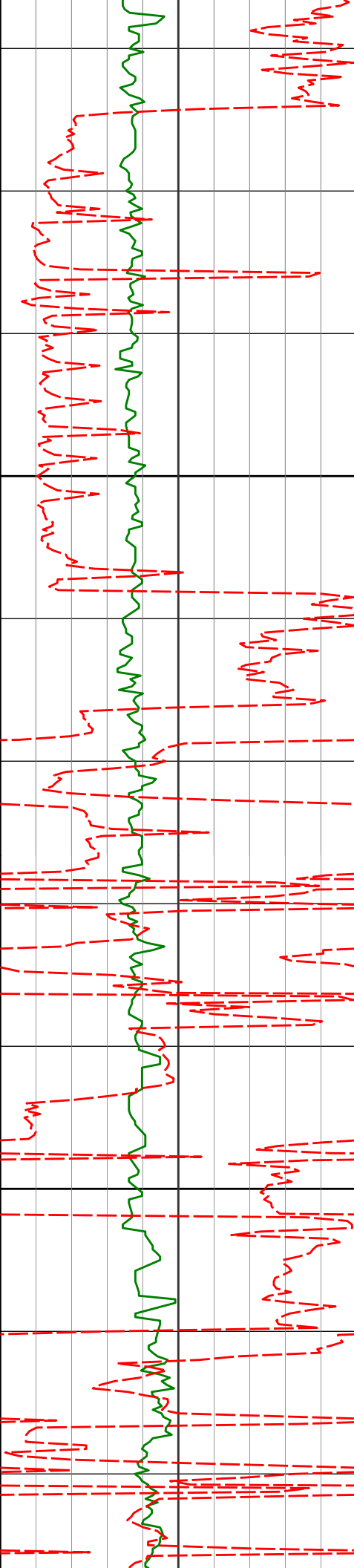
23.09'

3489'

5.72°

265.68° 3487.05'

23.02'



3600

3660'

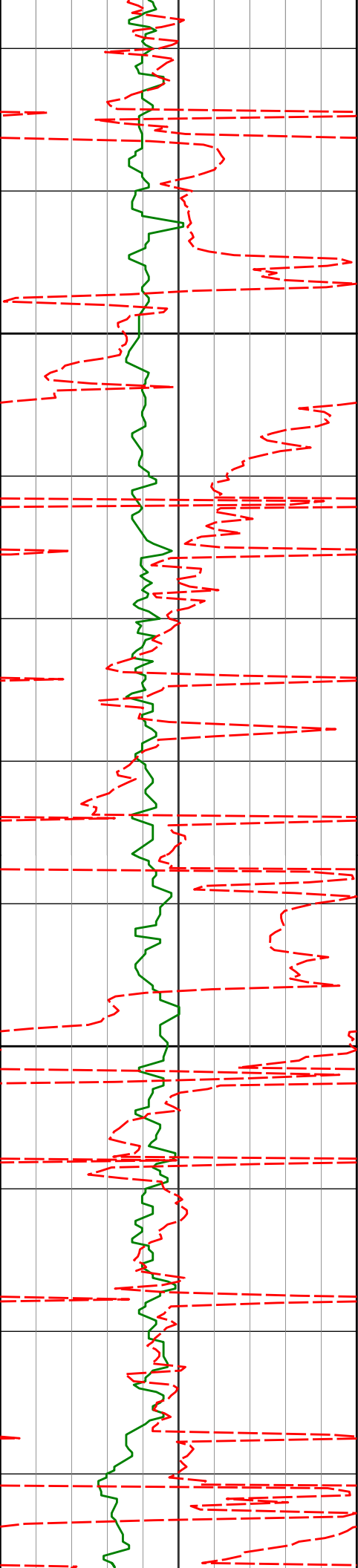
9.04°

274.09°

3656.61'

22.80'

3700



3800

3831'

9.68°

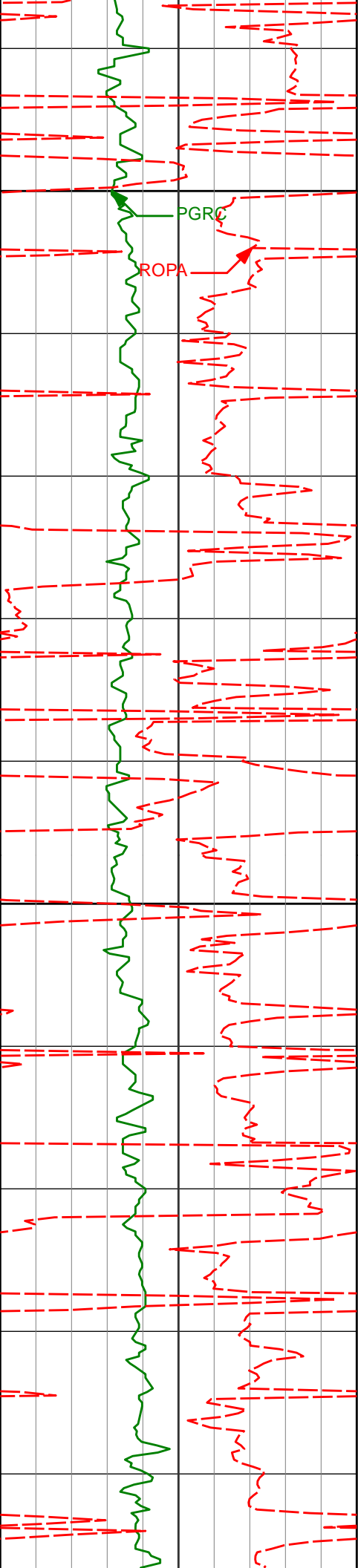
273.09°

3825.33'

21.20'

3900





4000

4003'

10.74°

271.61° 3994.61'

20.11'

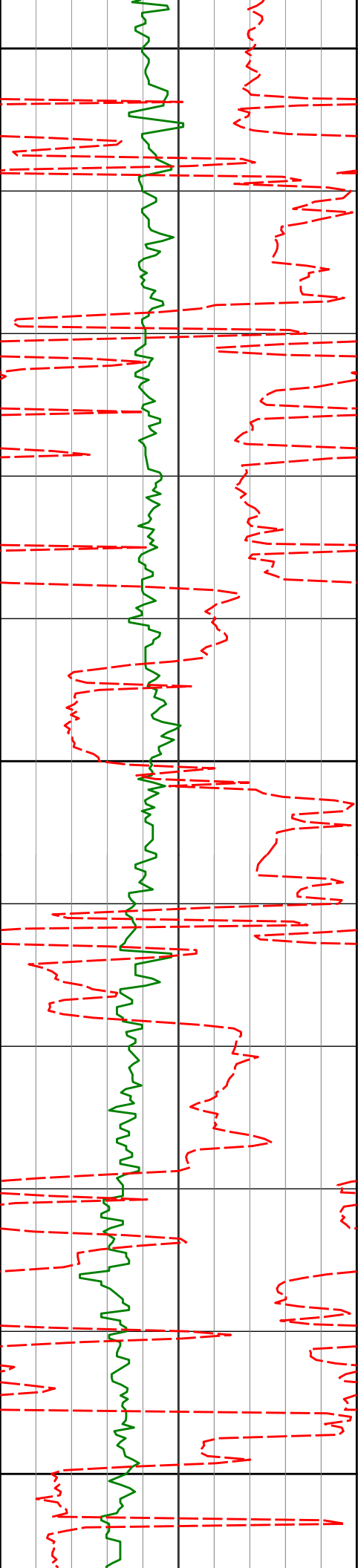
4100

4174'

9.62°

273.22° 4162.91'

18.99'



4200

4300

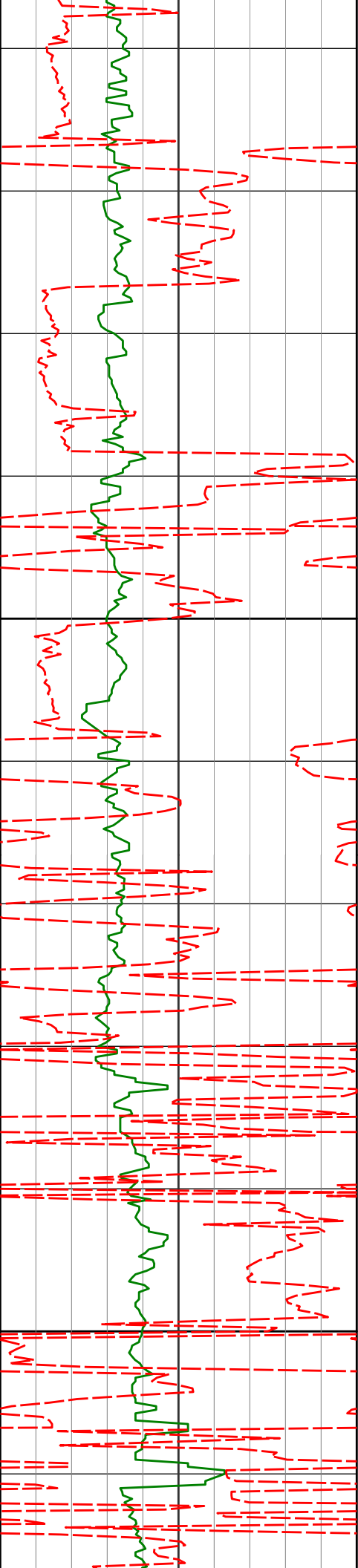
4345'

10.59°

272.93° 4331.26'

17.52'

4400



4500

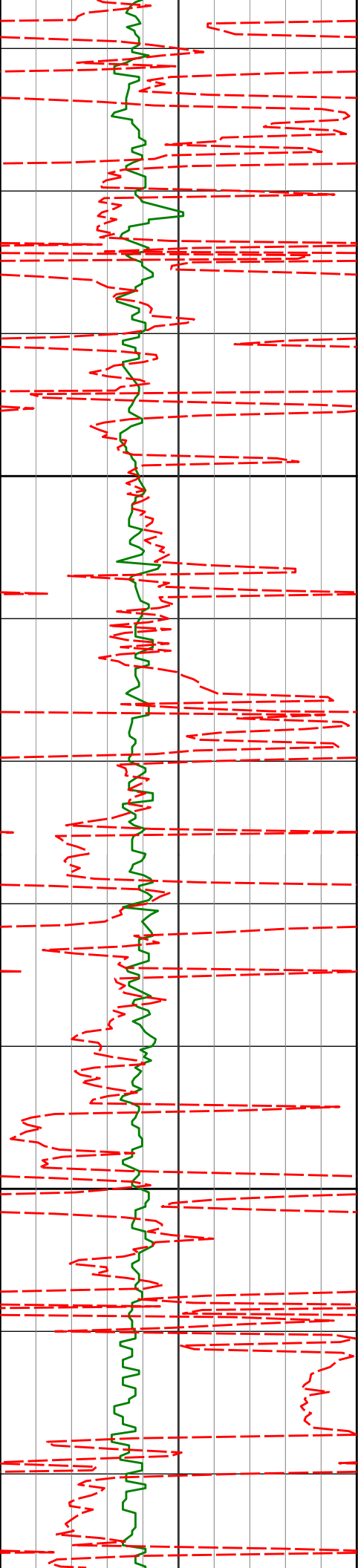
4516'

10.25°

272.76° 4499.44'

16.13'

4600



4700

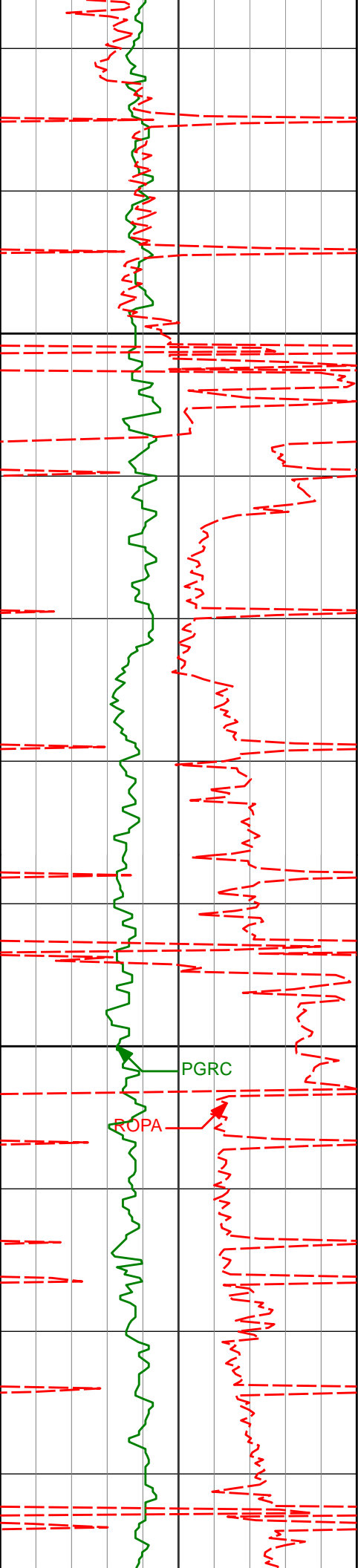
4800

4687'

10.21°

265.90° 4667.73'

16.62'



4900

5000

4857'

10.55°

267.46° 4834.95'

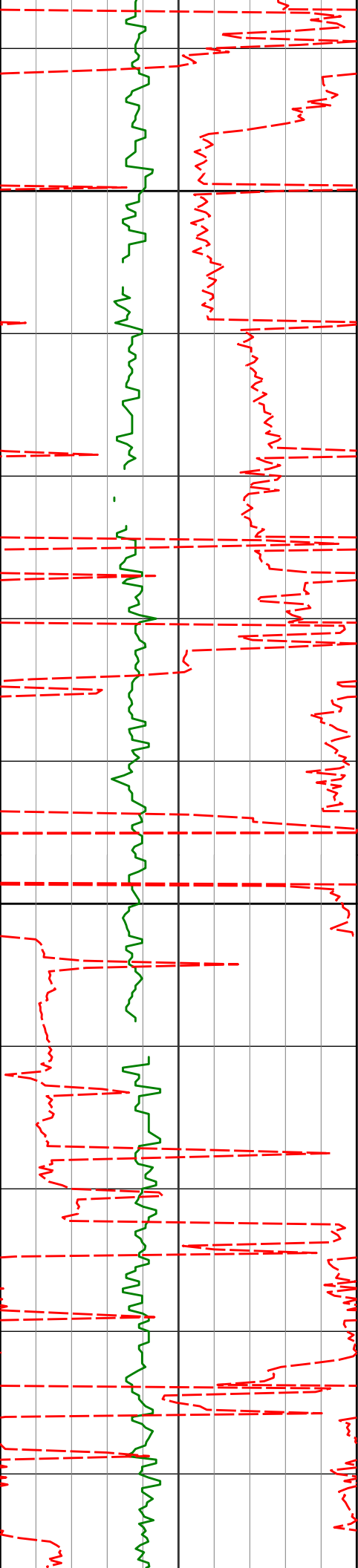
18.52'

5029'

11.26°

271.12° 5003.84'

19.04'



5100

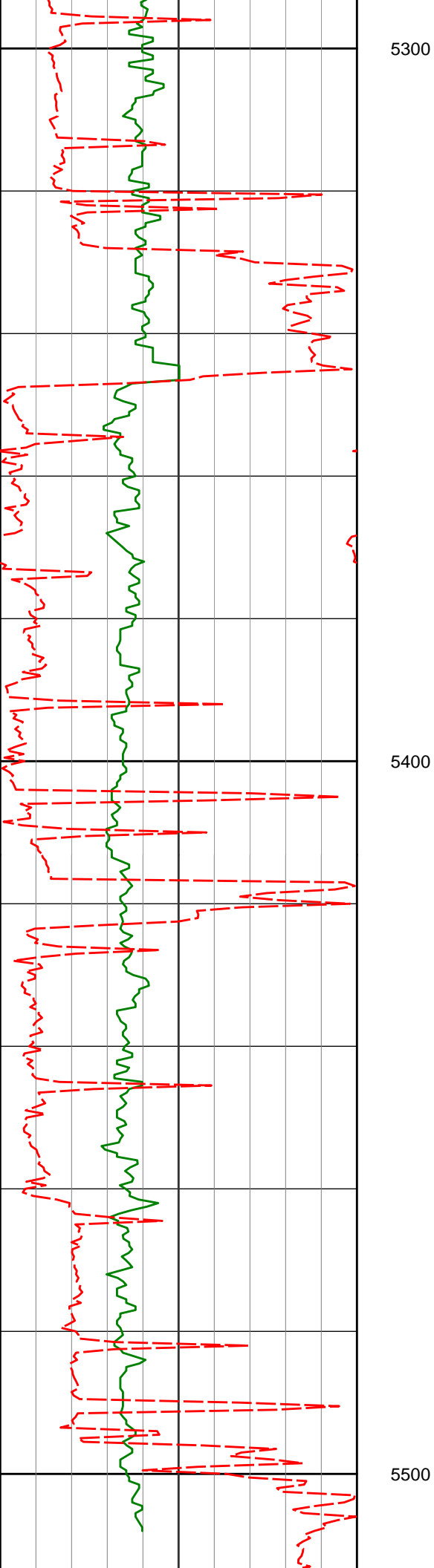
5200

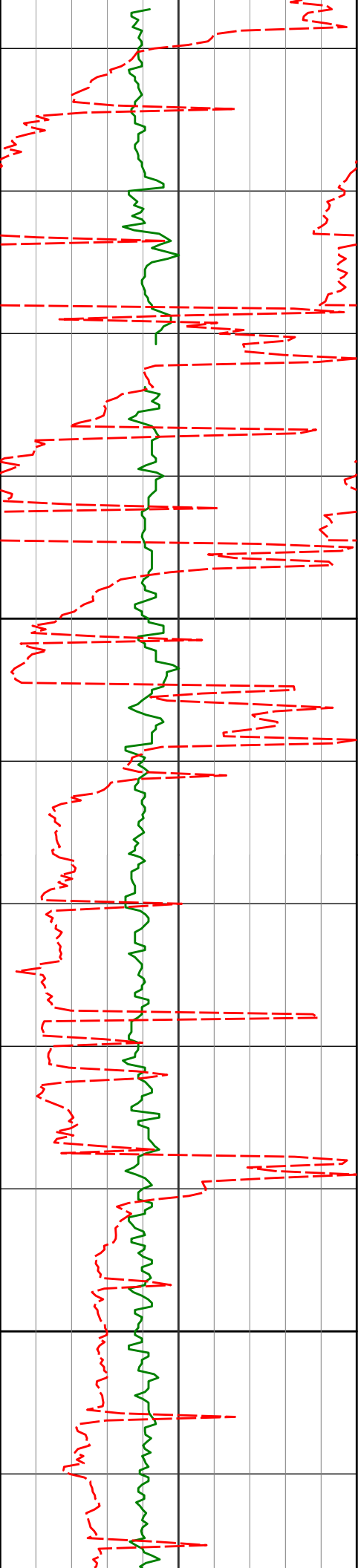
5200'

10.54°

271.67° 5171.75'

18.40'





5600

5700

5542'

11.17°

272.04° 5507.66'

19.54'

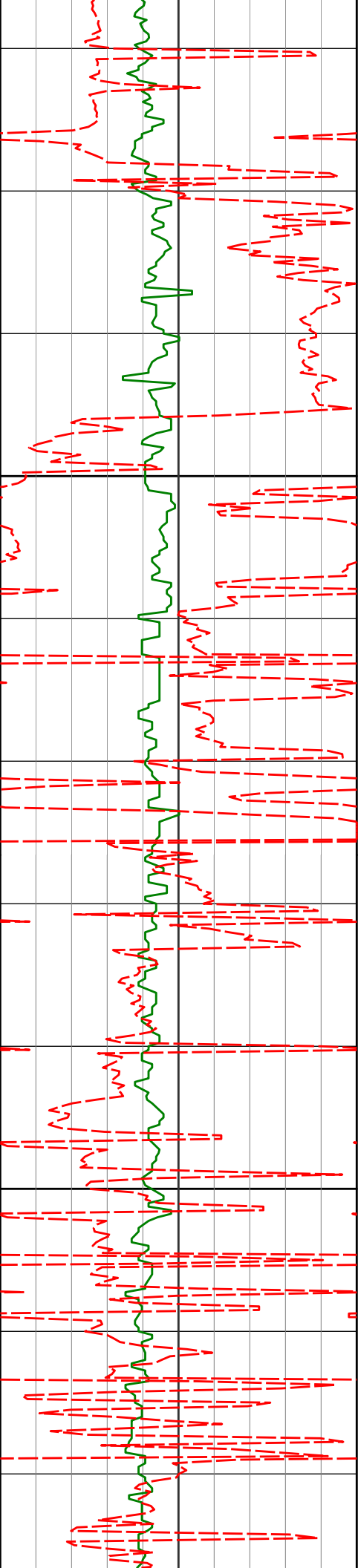
5713'

8.88°

274.56° 5676.03'

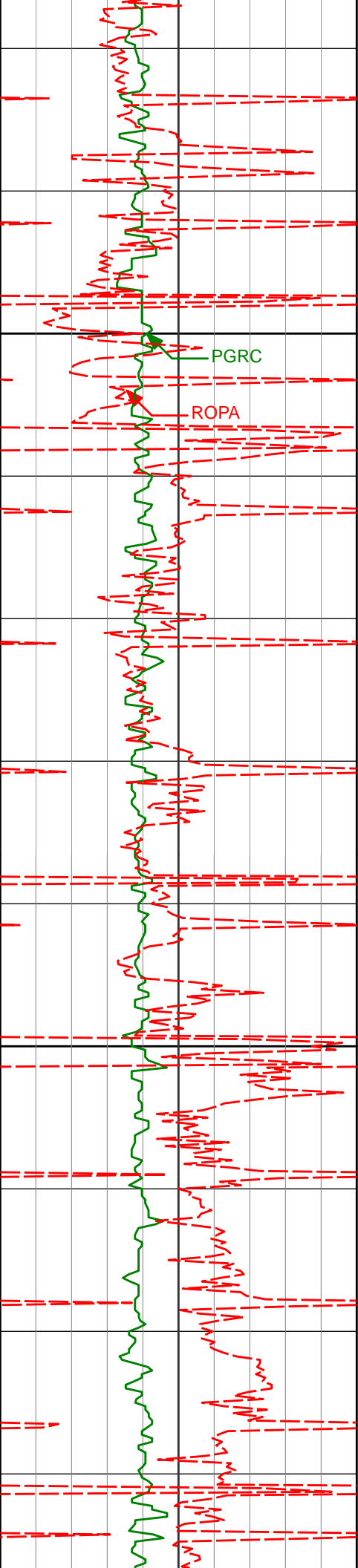
18.04'





5800

5900



5970'

7.24°

265.68° 5930.50'

17.85'

6000

PGRC

ROPA

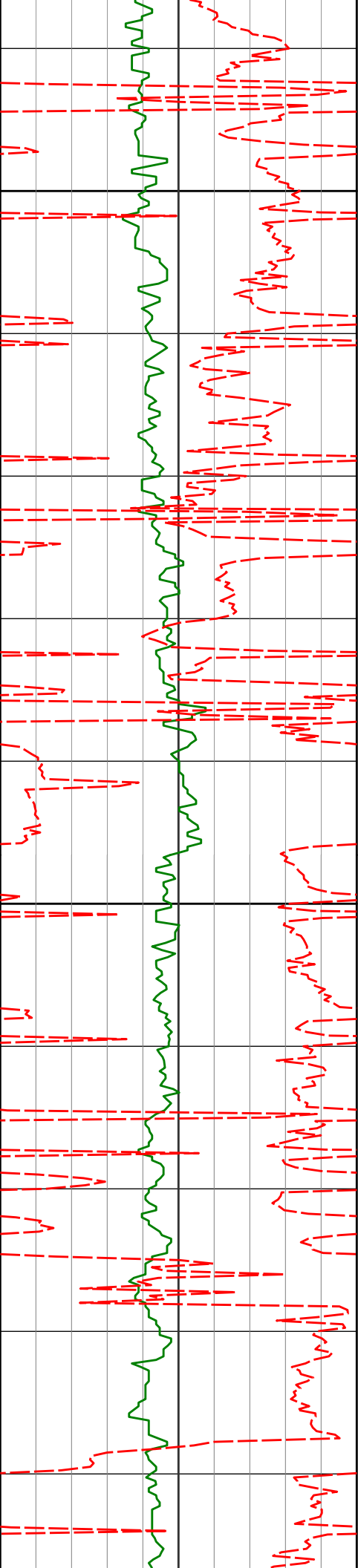
6100

6141'

5.54°

262.04° 6100.43'

19.89'



6200

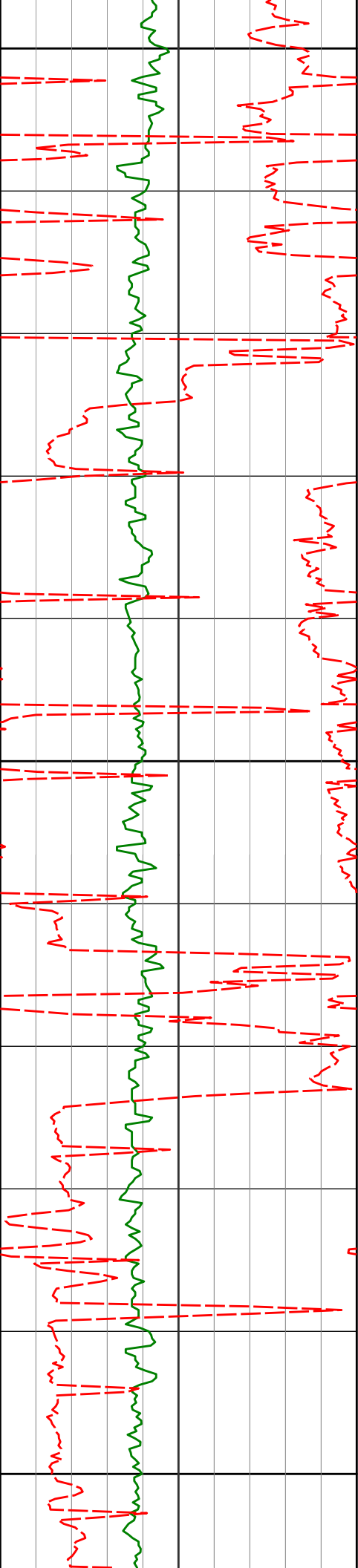
6300

6311'

4.20°

261.71° 6269.81'

21.98'



6400

6480'

1.40°

279.00°

6438.60'

22.59'

6500

6600

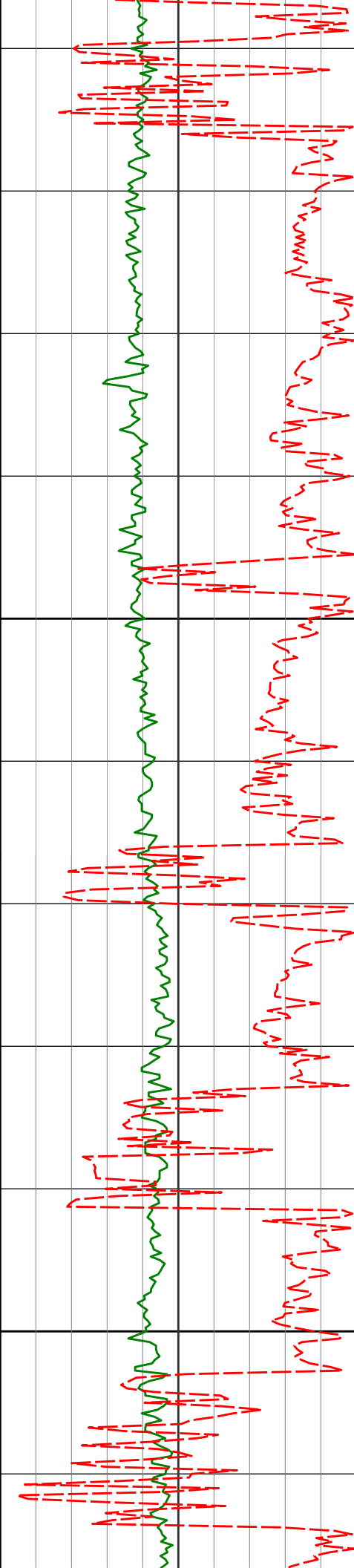
6609'

0.57°

243.78°

6567.58'

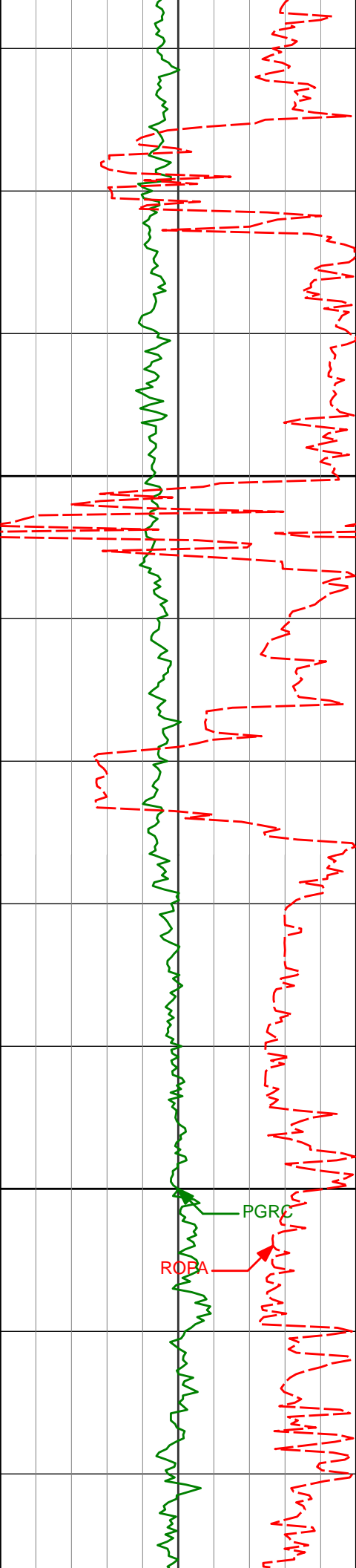
22.64'



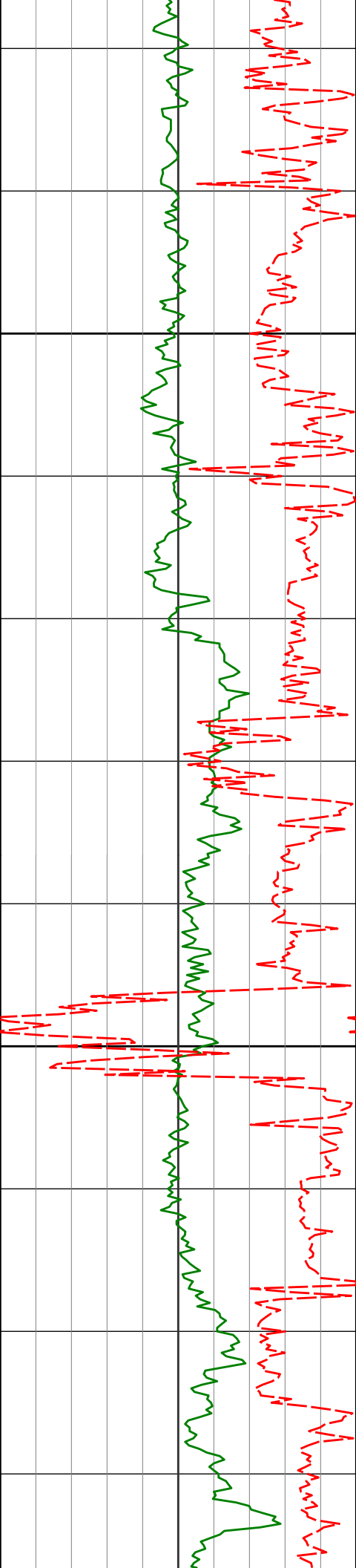
6700

6800

6651'	2.11°	174.78°	6609.56'	23.50'
6694'	7.24°	179.76°	6652.41'	27.00'
6737'	12.33°	176.27°	6694.77'	34.29'
6780'	14.94°	177.78°	6736.55'	44.41'
6823'	17.12°	177.71°	6777.88'	56.28'



6900	6866'	19.33°	176.81°	6818.72'	69.70'
	6908'	20.75°	176.82°	6858.18'	84.07'
	6951'	22.11°	177.78°	6898.20'	99.76'
	6993'	28.17°	179.35°	6936.21'	117.59'
	7036'	33.67°	182.38°	6973.08'	139.66'



7100

7200

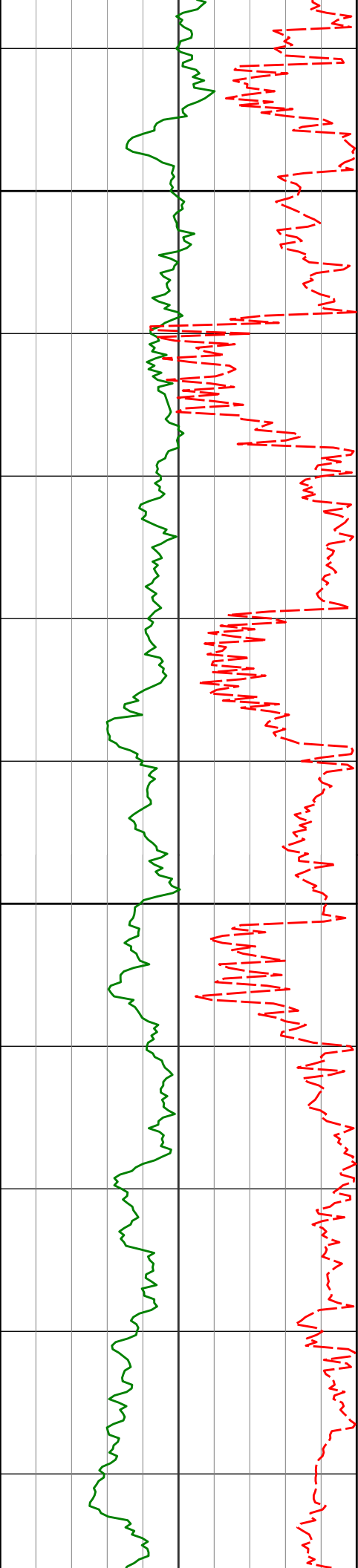
7078'	41.44°	180.32°	7006.35'	165.24'
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7121'	47.43°	178.38°	7037.05'	195.32'
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7164'	52.52°	178.30°	7064.69'	228.22'
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7207'	56.60°	177.81°	7089.62'	263.22'
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7249'	60.43°	178.12°	7111.55'	299.00'
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7300

7292' 64.35° 177.78° 7131.48' 337.06'

7334' 67.50° 176.39° 7148.61' 375.35'

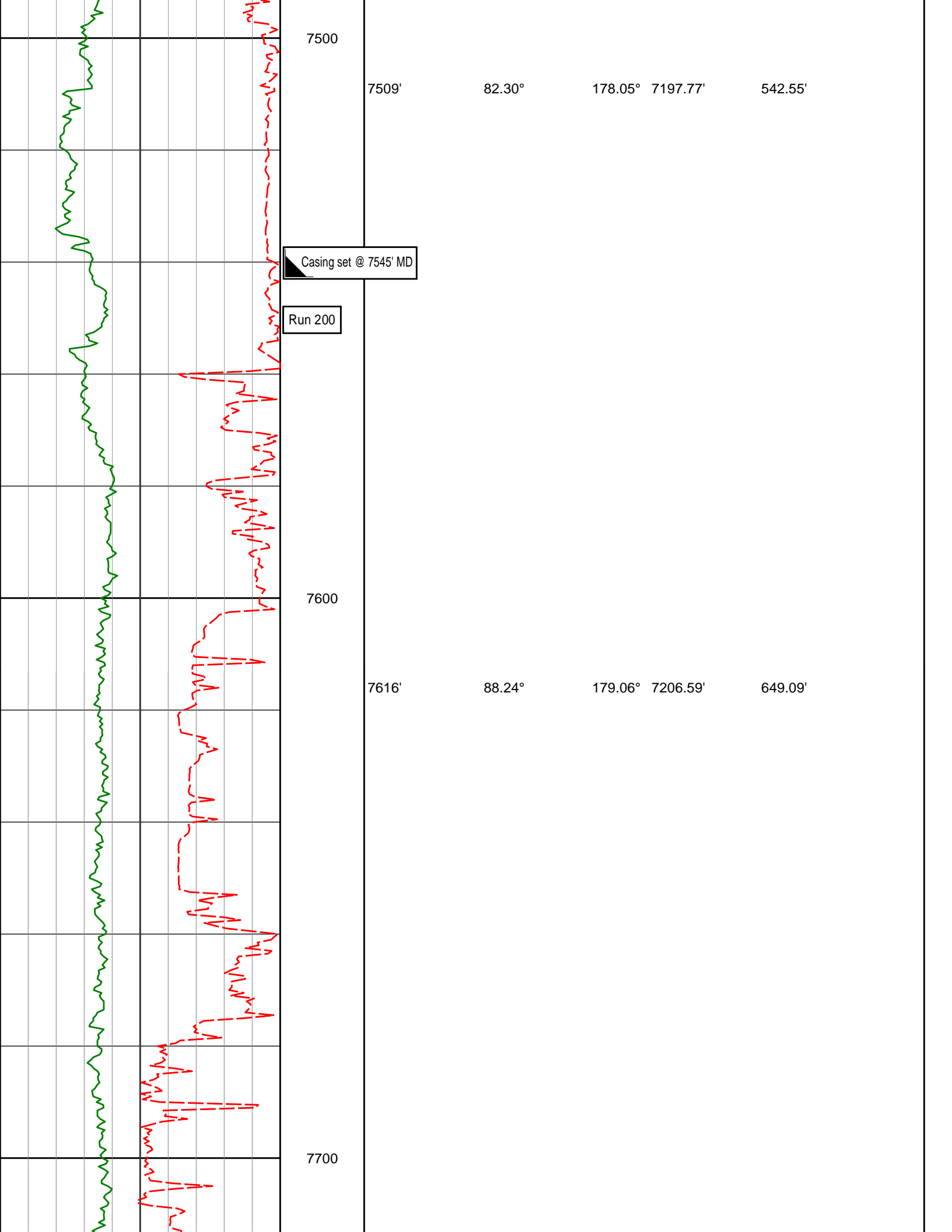
7377' 69.63° 176.85° 7164.32' 415.29'

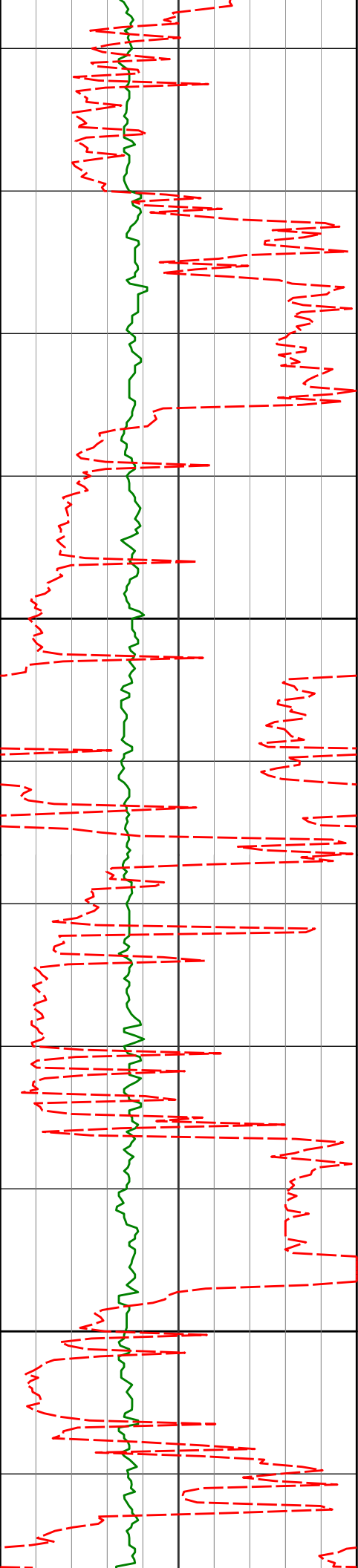
7400

7418' 73.02° 176.73° 7177.45' 454.05'

7461' 76.25° 177.80° 7188.84' 495.45'







7800

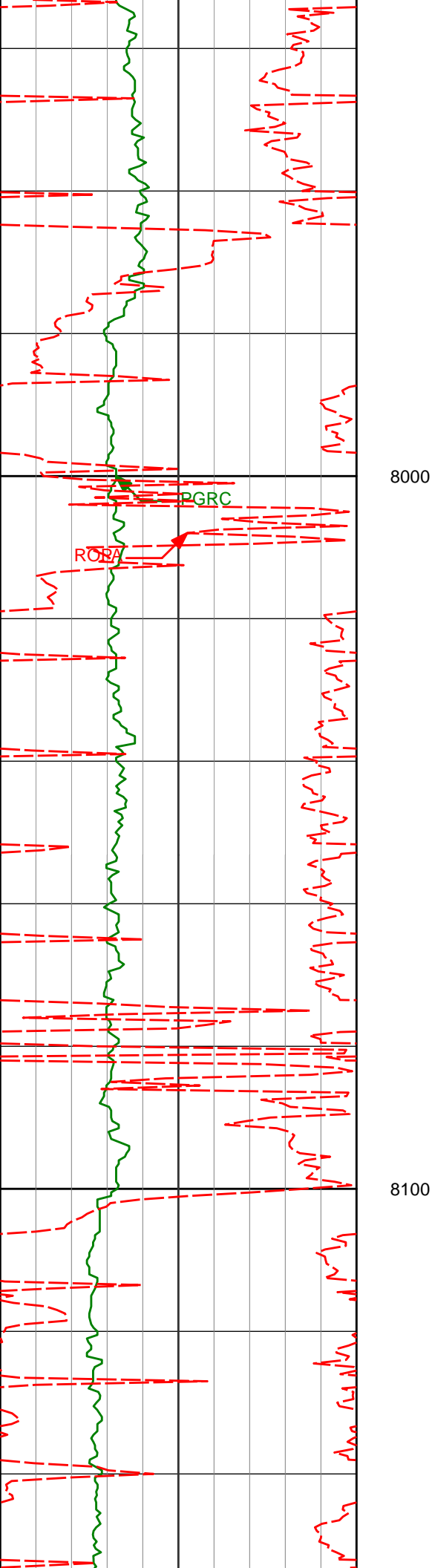
7900

7787'

89.88°

181.05° 7209.39'

820.06'



7958'

91.29°

181.22° 7207.65'

991.02'

8000

PGRC

ROBA

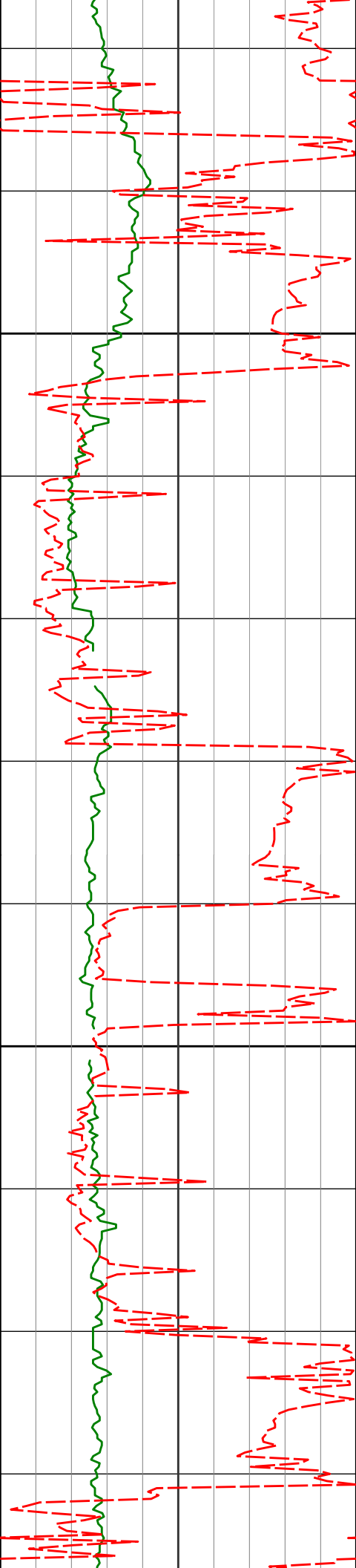
8100

8130'

91.73°

180.79° 7203.11'

1162.95'



8200

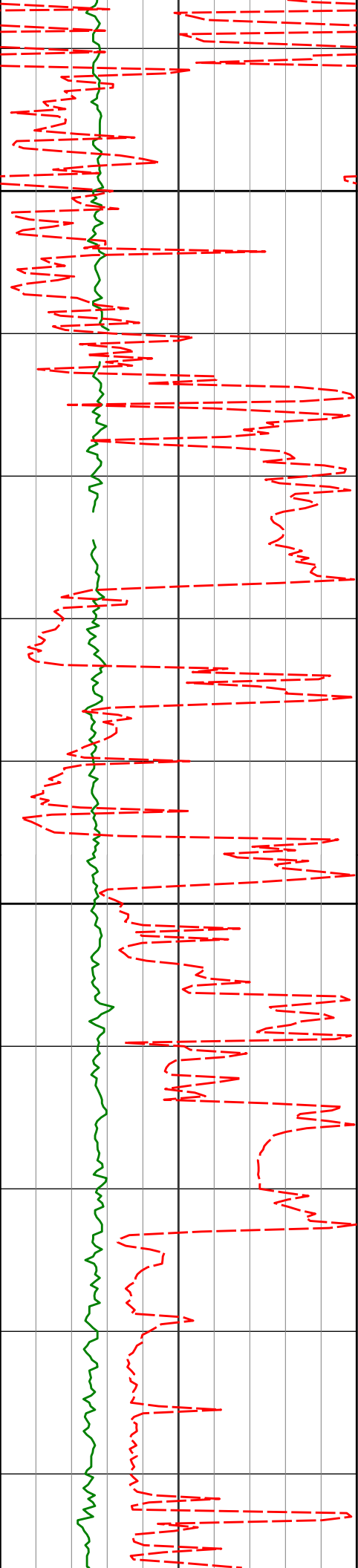
8300

8301'

89.48°

180.96° 7201.31'

1333.92'



8400

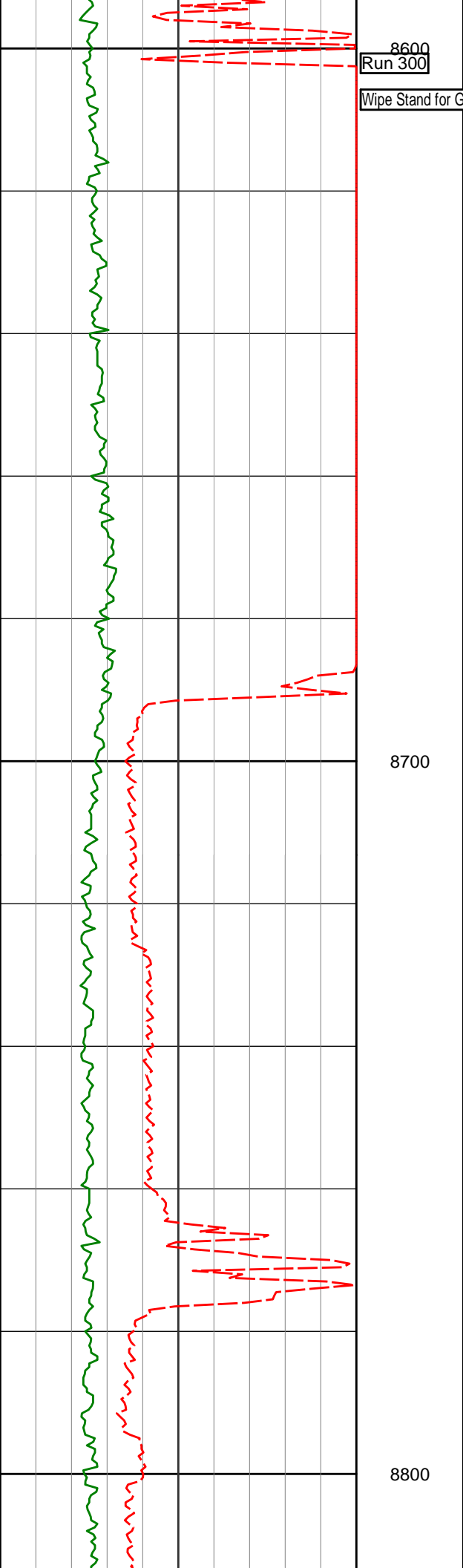
8472'

88.71°

180.55° 7204.01'

1504.89'

8500



8644'

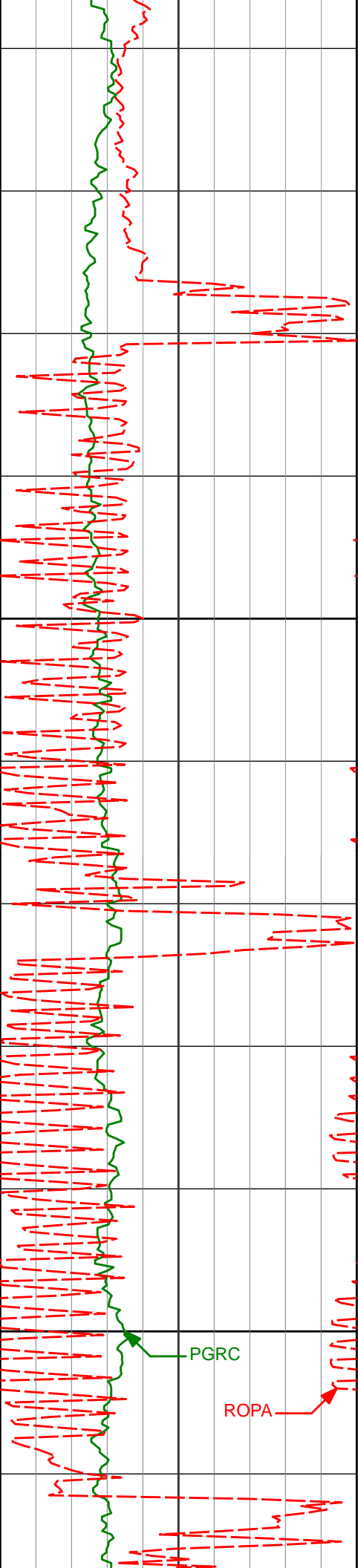
88.67°

181.03° 7207.94'

1676.83'

8700

8800



8900

9000

PGRC

ROPA

8814'

90.00°

180.87° 7209.92'

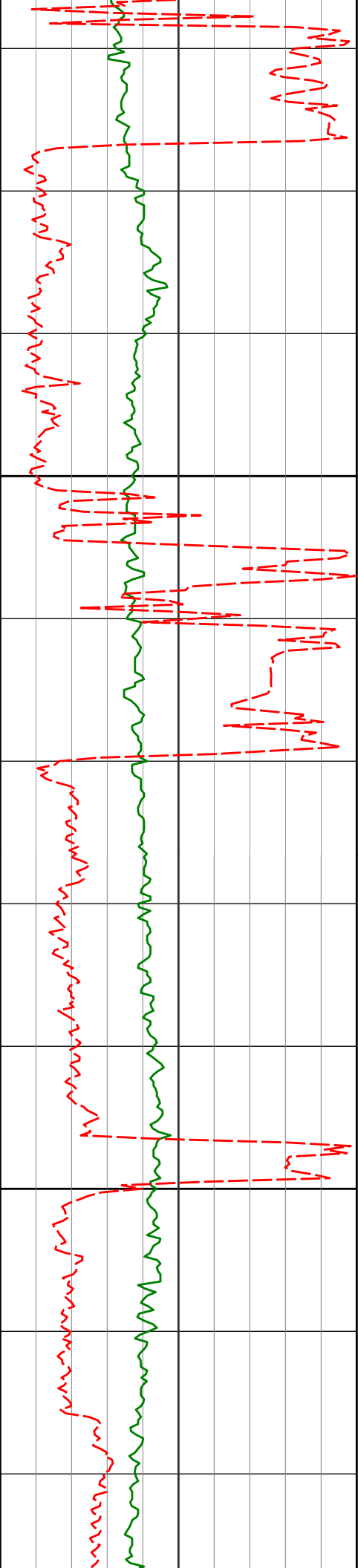
1846.81'

8985'

90.74°

180.34° 7208.81'

2017.80'



9100

9155'

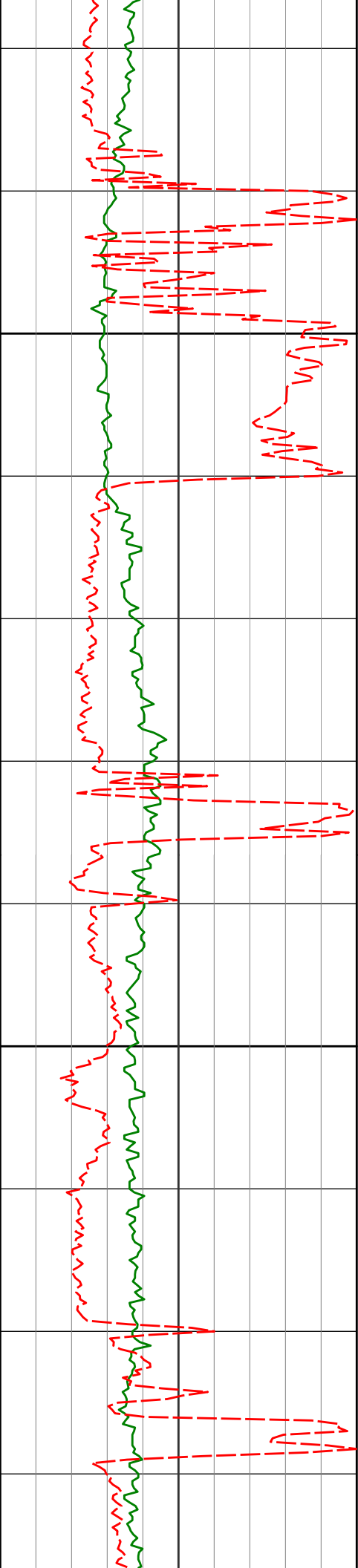
89.45°

180.79° 7208.53'

2187.79'

9200





9300

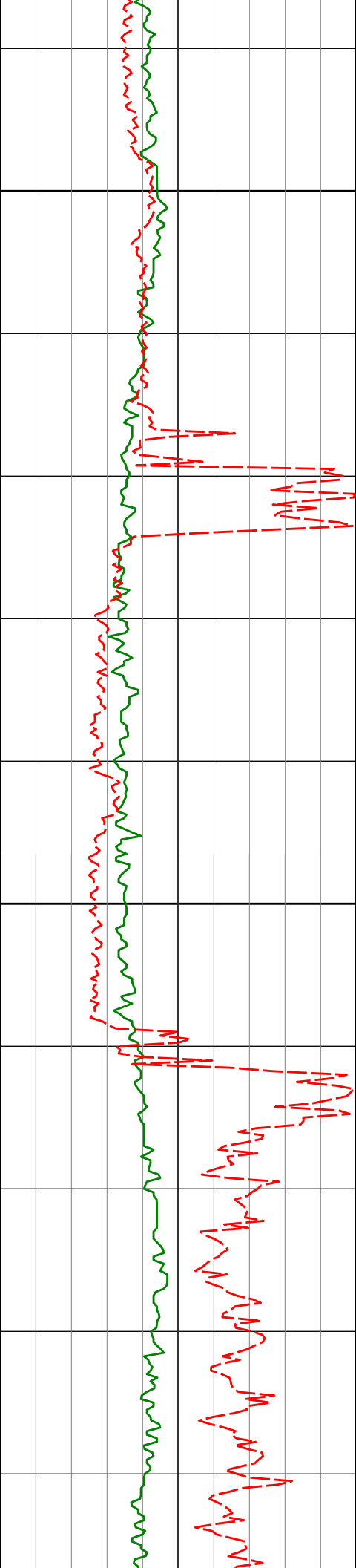
9326'

88.00°

180.76° 7212.33'

2358.74'

9400



9500

9497'

88.49°

180.82° 7217.57'

2529.65'

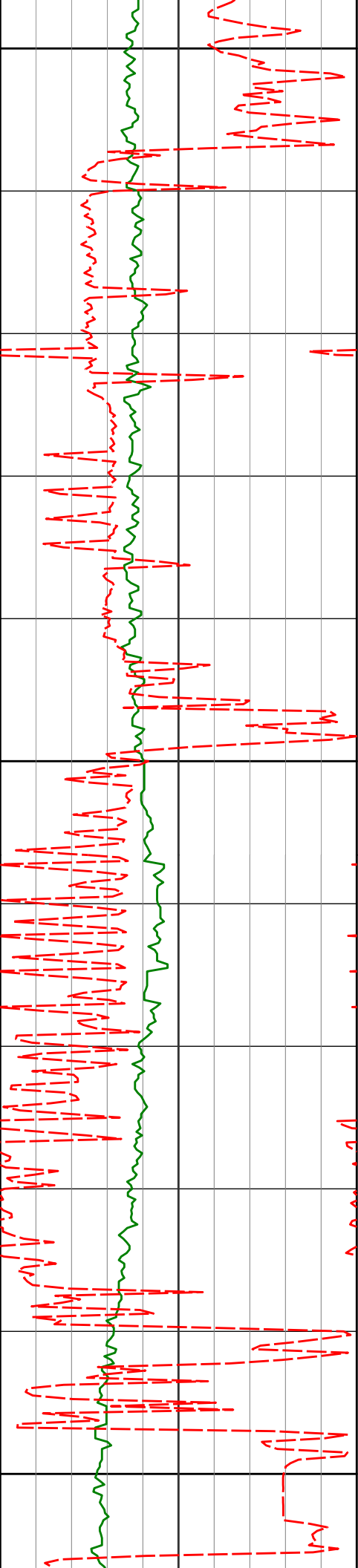
9600

9668'

89.20°

180.45° 7221.02'

2700.61'



9700

9800

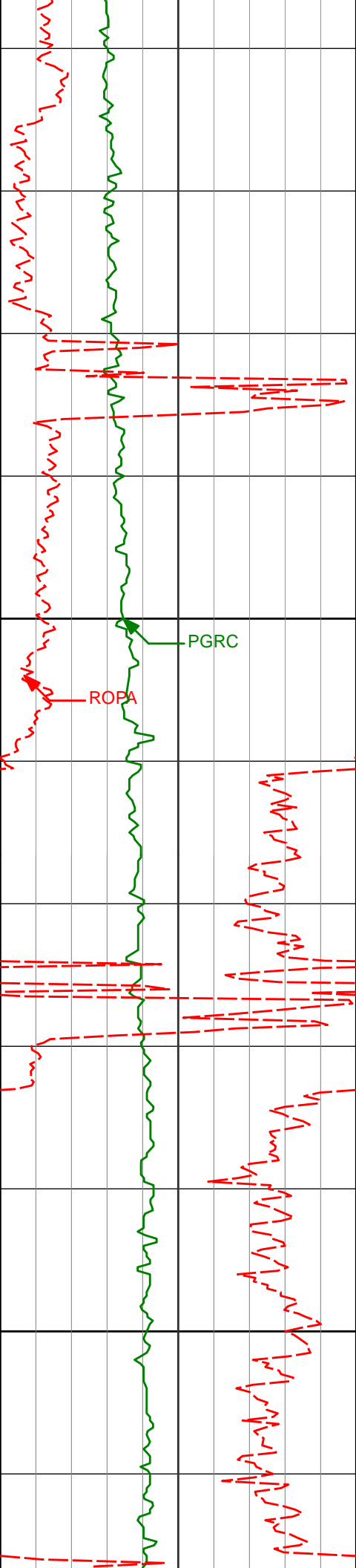
9900

9839'

89.85°

180.35° 7222.44'

2871.60'



10000

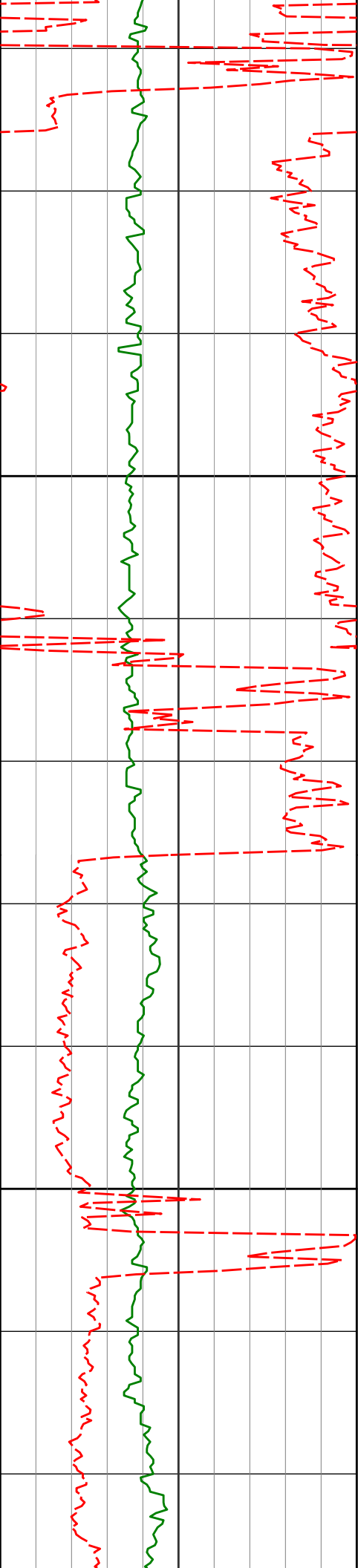
10010'

88.80°

180.51° 7224.45'

3042.59'

10100



10181'

89.54°

180.82° 7226.93'

3213.56'

10200

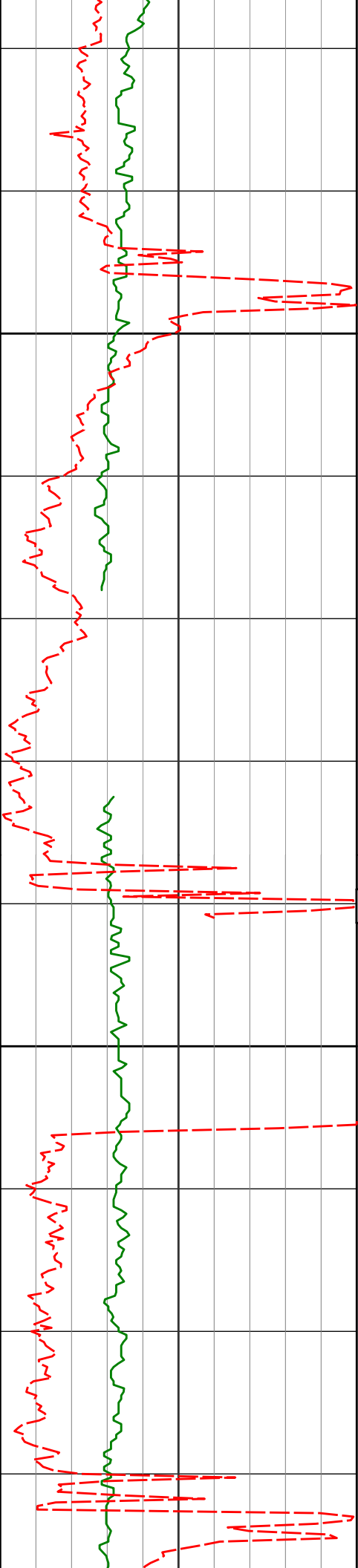
10300

10352'

88.30°

181.32° 7230.15'

3384.51'



10400

Pason Comm Issues

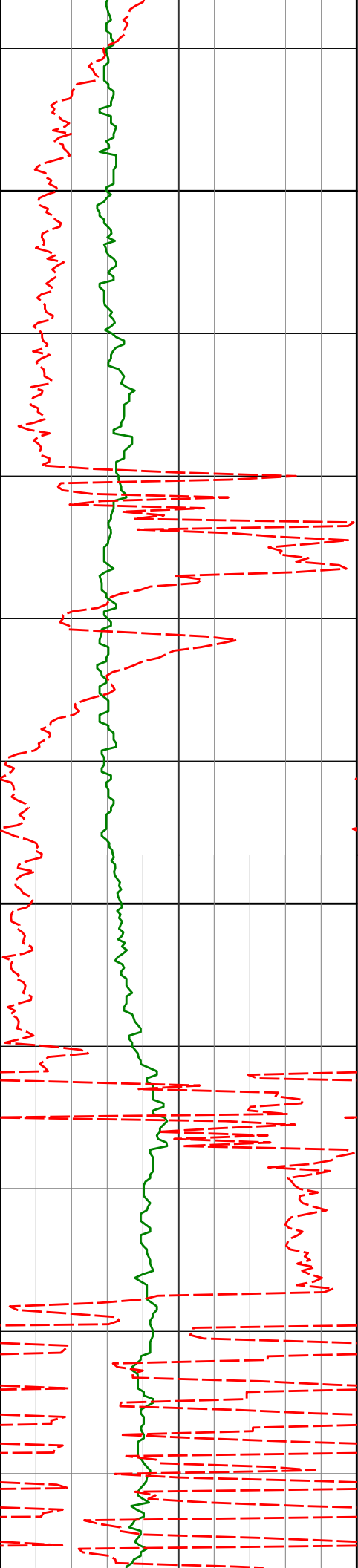
10500

10523'

89.14°

180.93° 7233.97'

3555.45'



10600

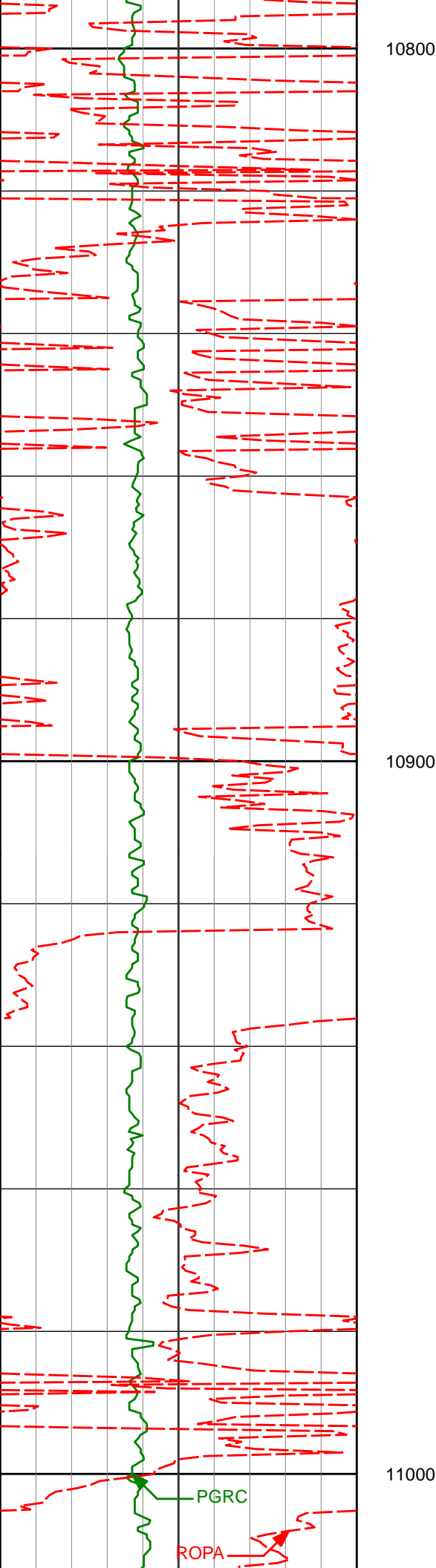
10700

10694'

90.06°

180.66° 7235.16'

3726.43'



10865'

89.51°

180.22° 7235.81'

3897.43'

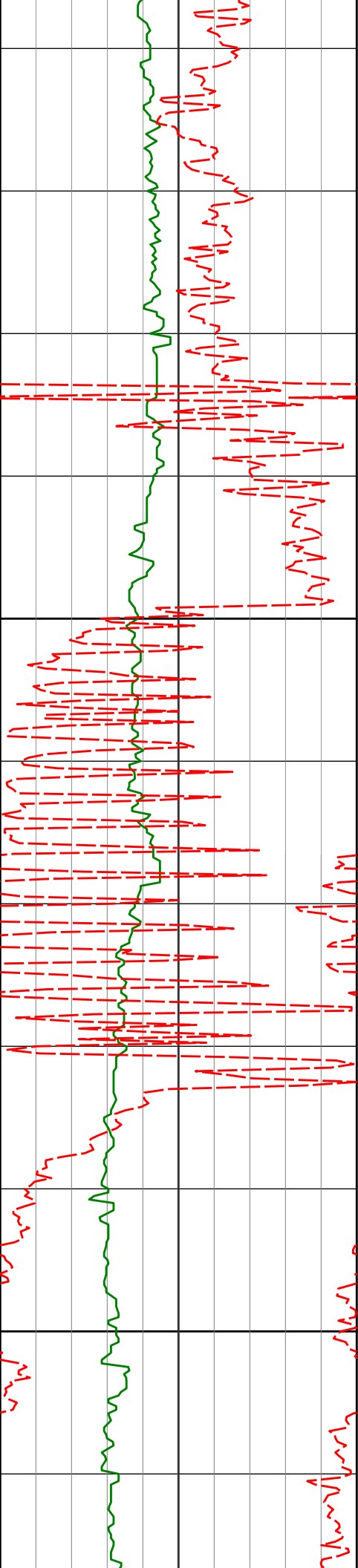
10900

11000

PGRC

ROPA





11100

11200

11036'

90.03°

179.75° 7236.49'

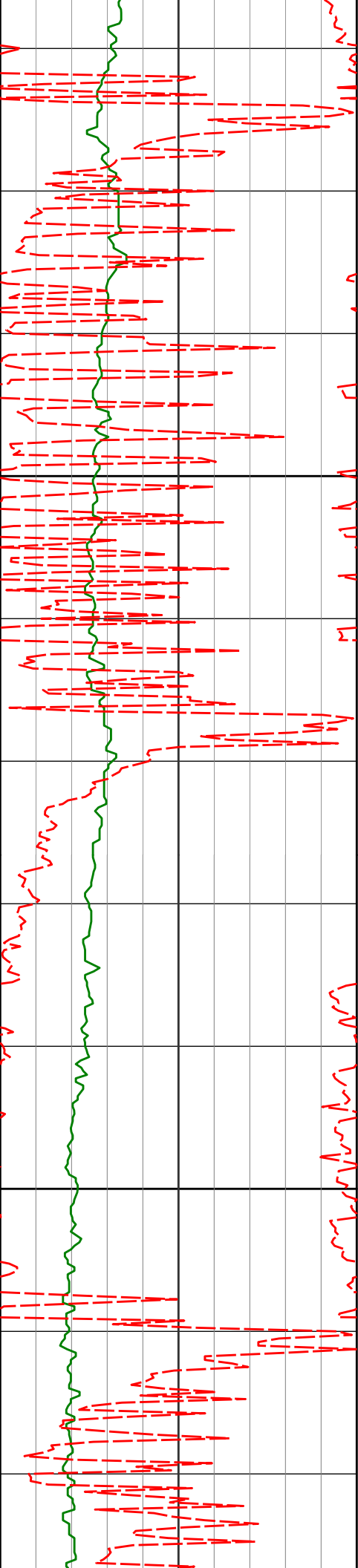
4068.43'

11207'

88.52°

178.81° 7238.66'

4239.38'



11300

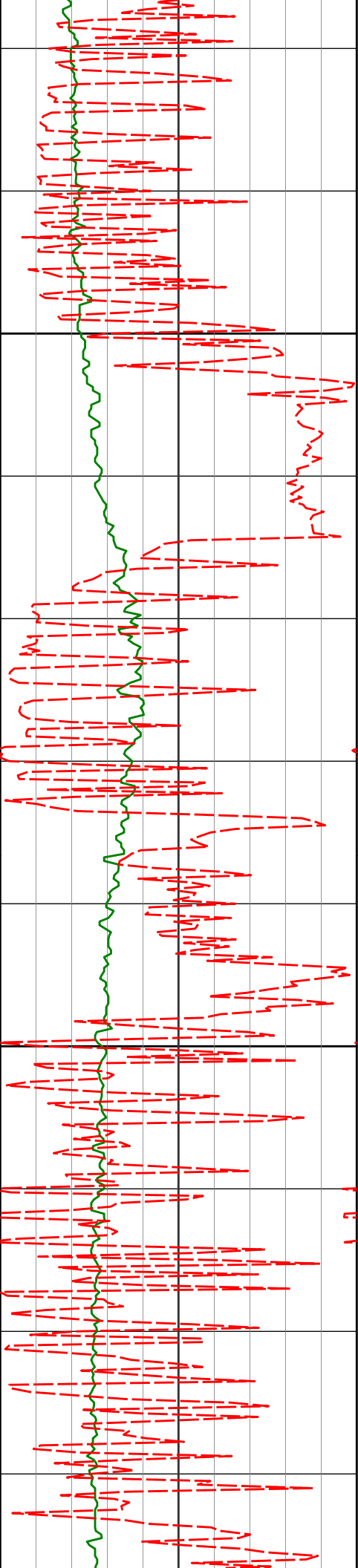
11378'

89.32°

178.62° 7241.88'

4410.29'

11400



11500

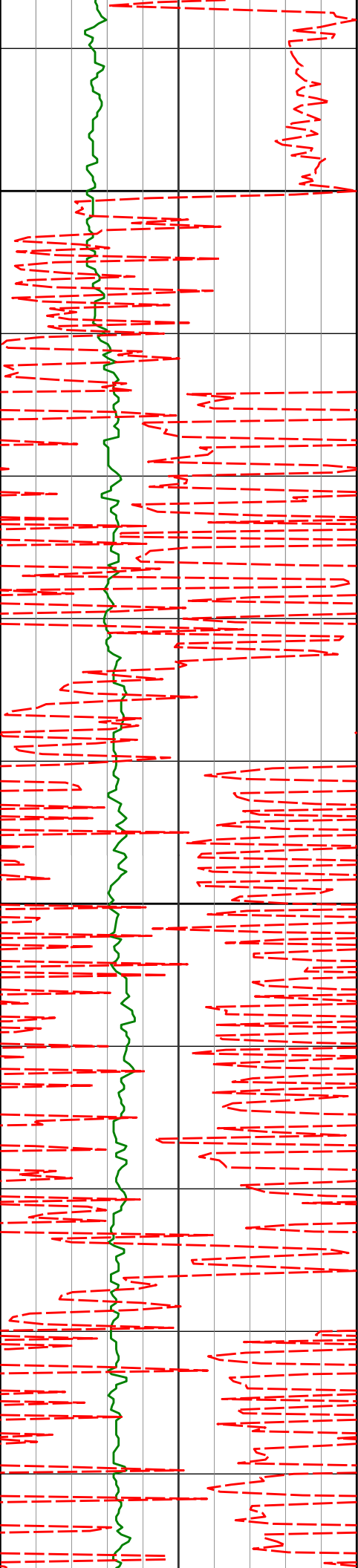
11549'

89.08°

179.68° 7244.27'

4581.24'

11600



11700

11720'

88.43°

180.79° 7247.98'

4752.19'

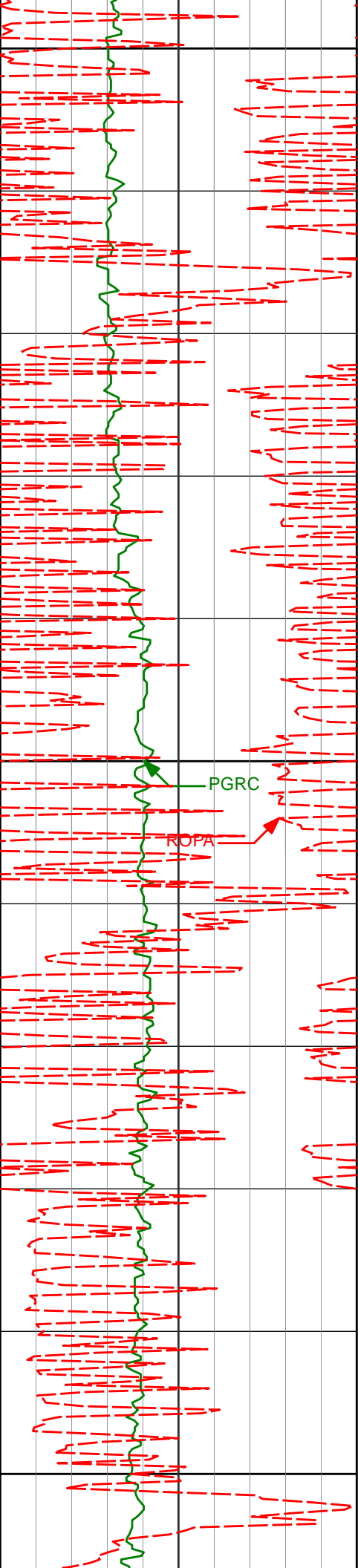
11800

11891'

89.32°

180.44° 7251.34'

4923.15'



11900

12000

12062'

12100

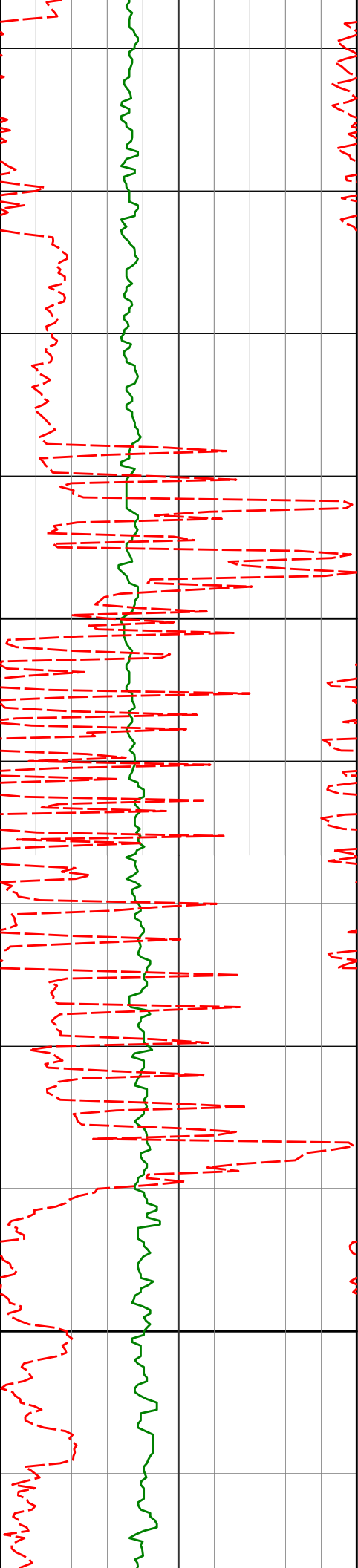
PGRC

ROPA

90.03°

180.37° 7252.31'

5094.15'



12200

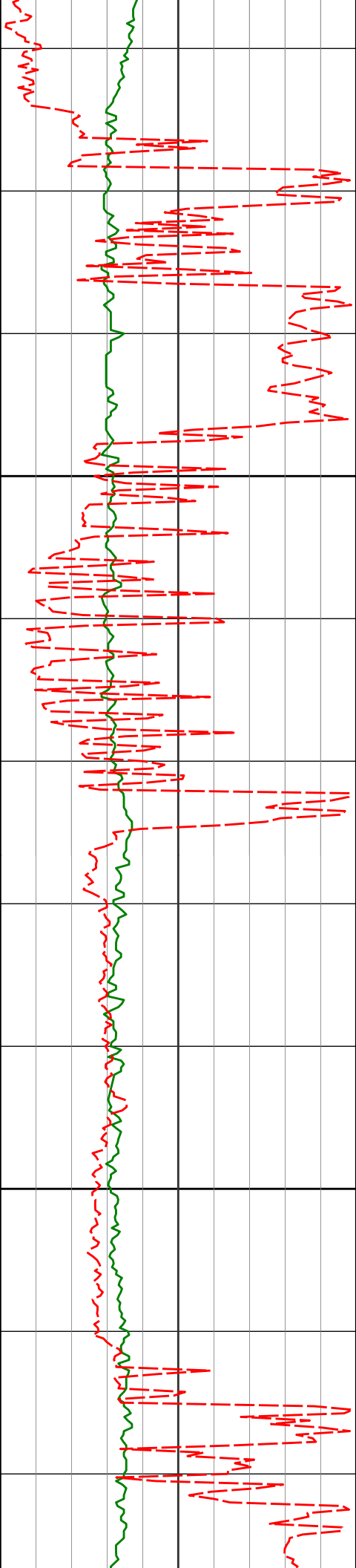
12233'

90.65°

180.28° 7251.30'

5265.15'

12300



12400

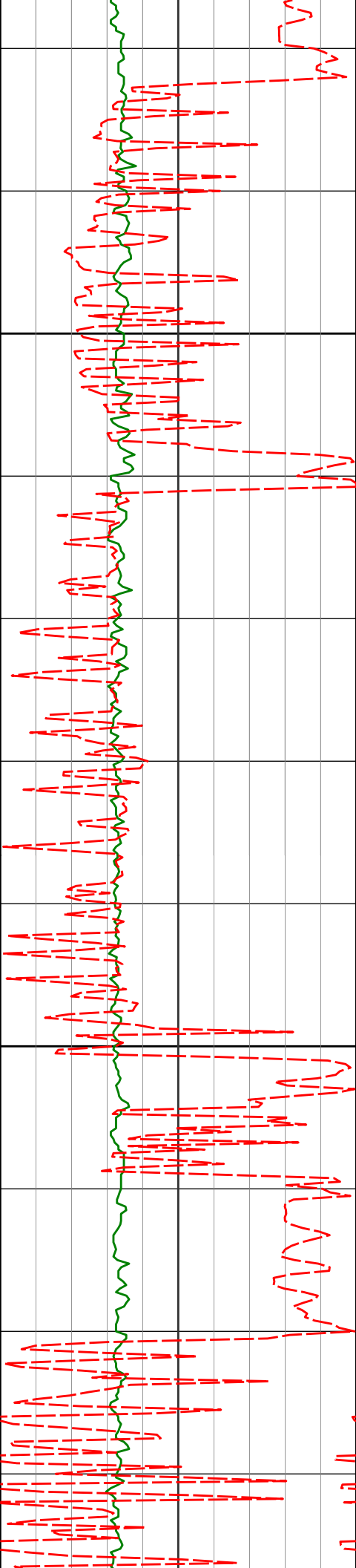
12405'

90.37°

181.17° 7249.76'

5437.13'

12500



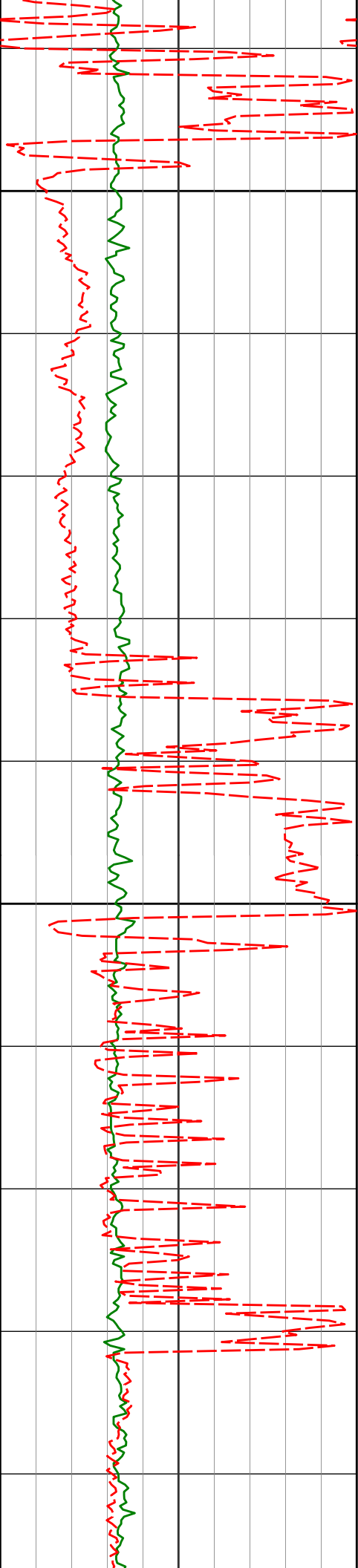
12600

12700

12574'      90.06°      180.93°    7249.13'      5606.11'

12745'      89.45°      181.44°    7249.86'      5777.09'





12800

12900

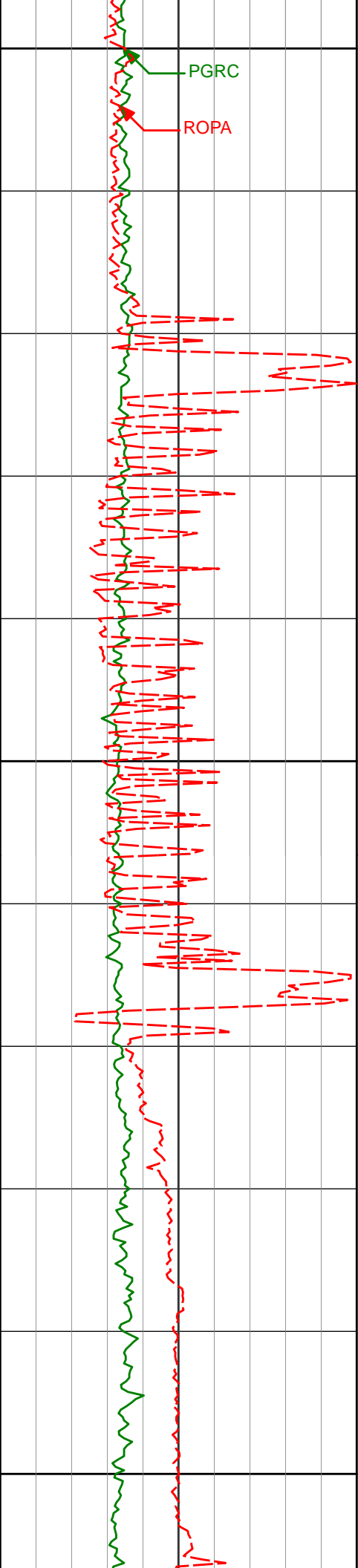
12915'

89.45°

180.93°

7251.49'

5947.06'



13000

13100

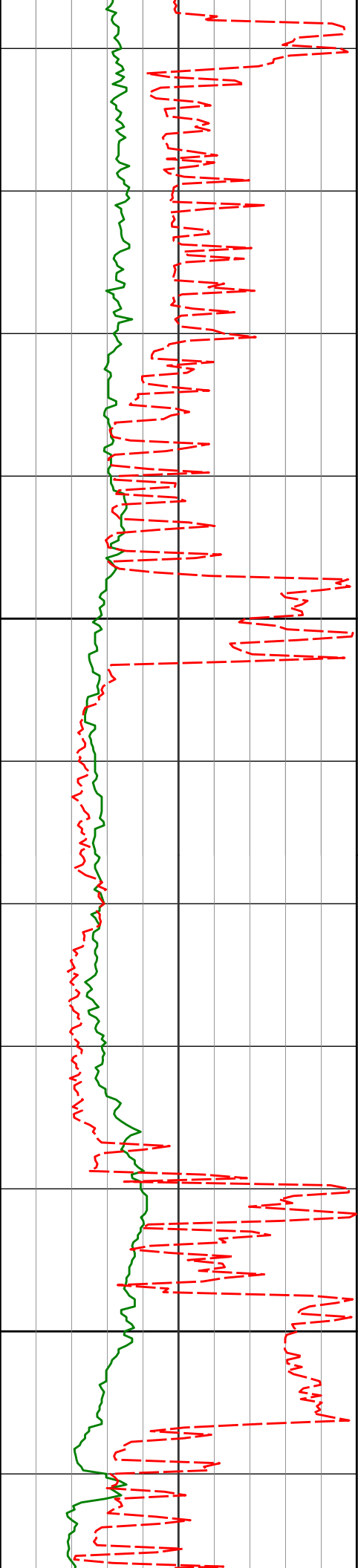
13200

13086'

90.00°

180.46° 7252.31'

6118.05'



13300

13400

13254'

91.14°

179.84° 7250.64'

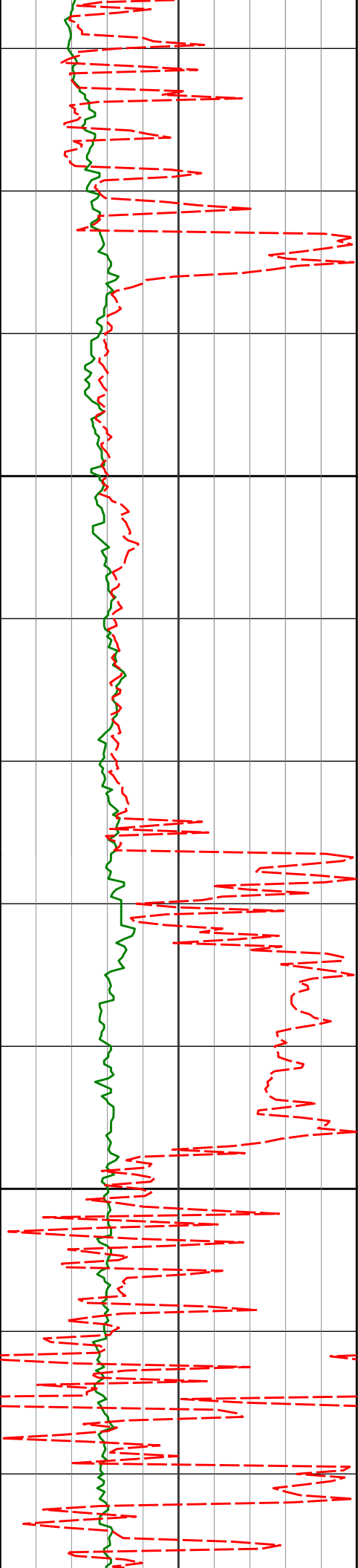
6286.04'

13425'

91.11°

180.71° 7247.29'

6457.00'



13500

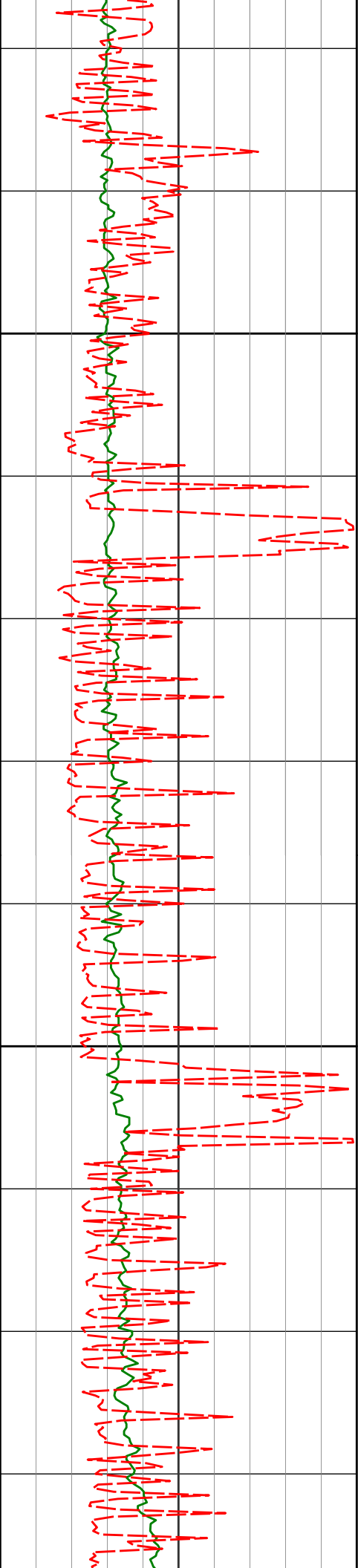
13600

13596'

89.88°

180.52° 7245.81'

6627.99'



13700

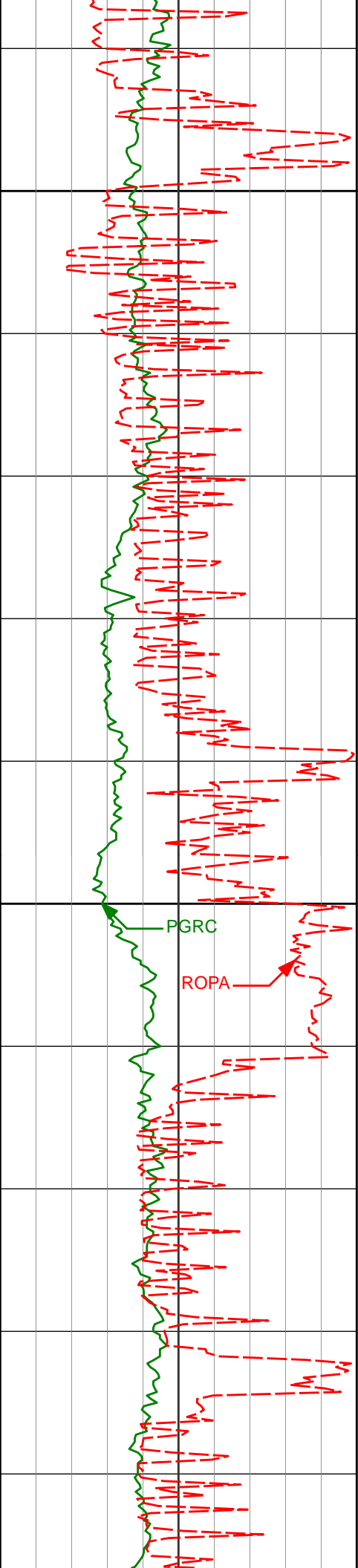
13768'

89.60°

179.94° 7246.59'

6799.99'

13800



13900

13939'

90.52°

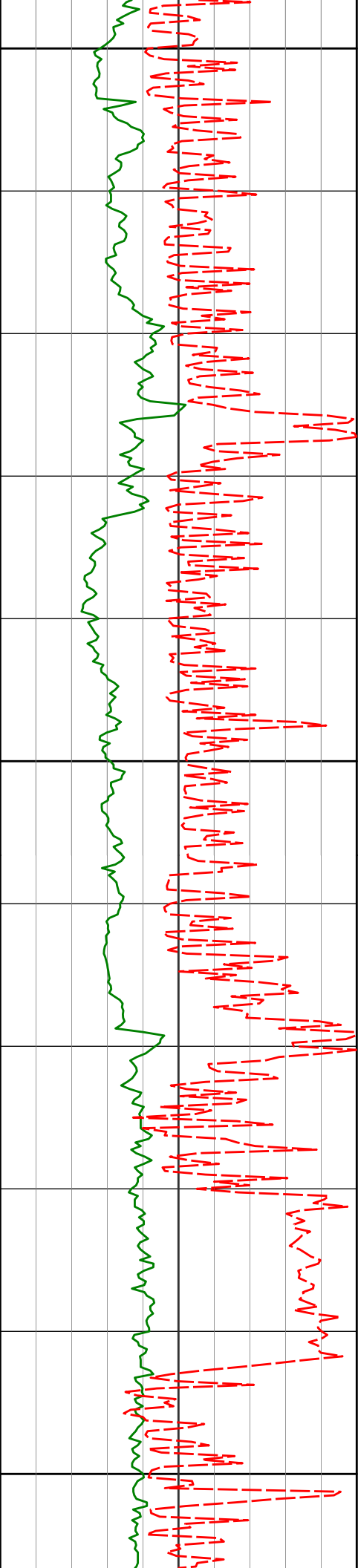
179.62° 7246.41'

6970.98'

14000

PGRC

ROPA



14100

14110'

90.49°

179.83° 7244.90'

7141.96'

14200

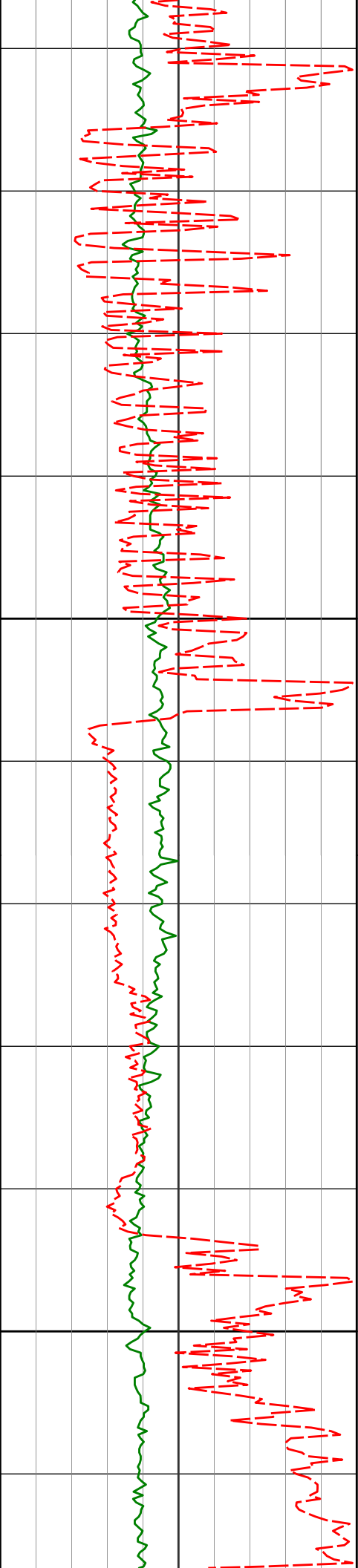
14282'

89.63°

179.35° 7244.72'

7313.95'

14300



14400

14452'

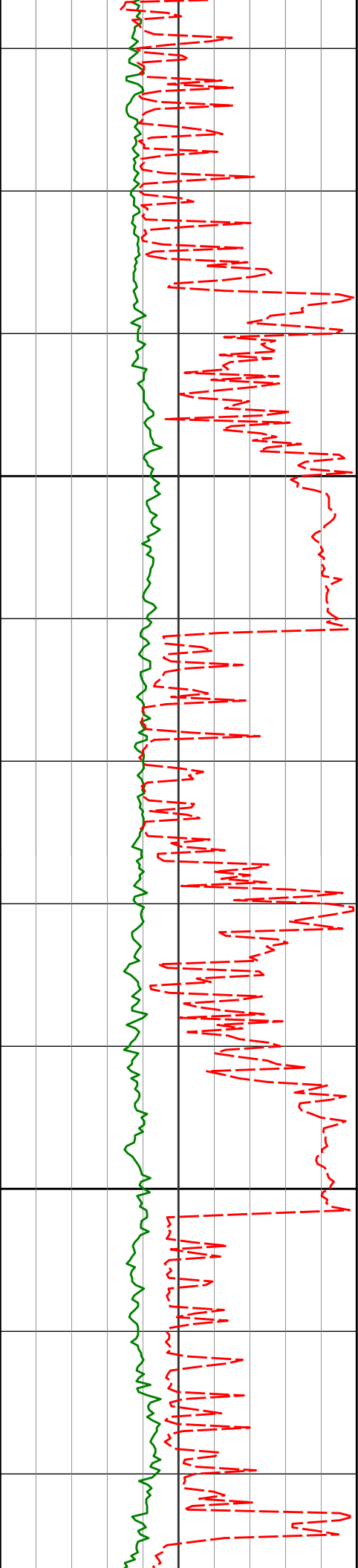
90.55°

179.19° 7244.46'

7483.92'

14500





14600

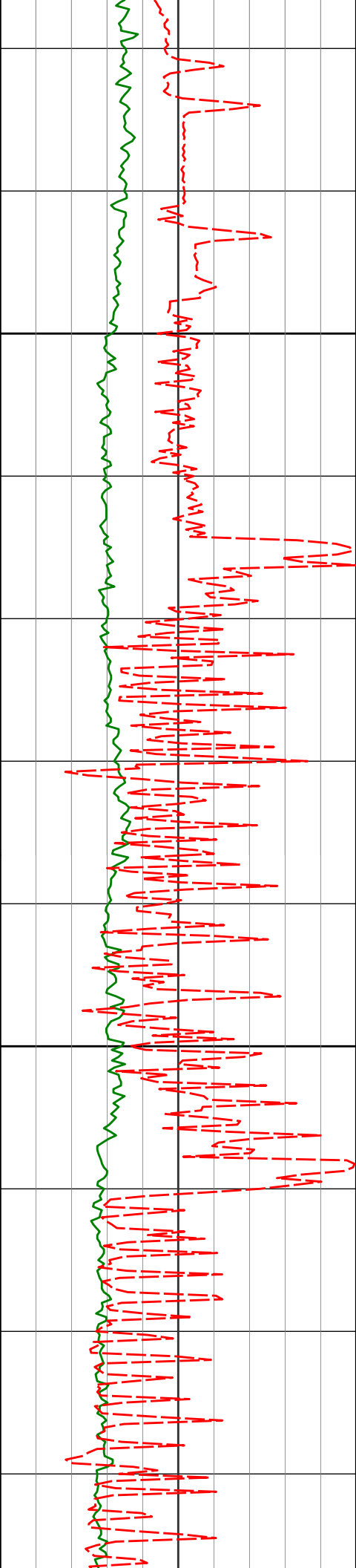
14621'

89.72°

180.31° 7244.06'

7652.91'

14700



14800

14900

14792'

89.51°

180.67° 7245.21'

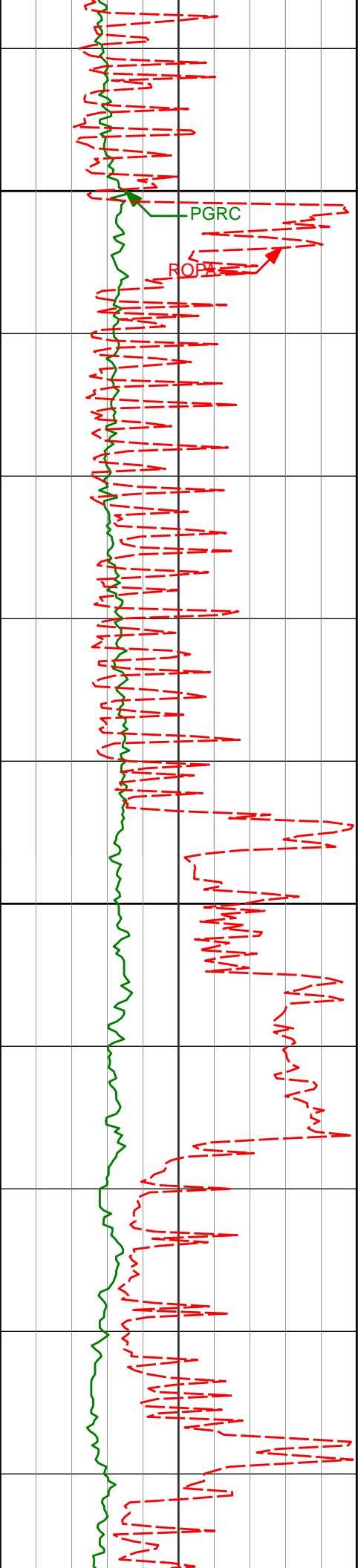
7823.91'

14963'

90.06°

180.33° 7245.85'

7994.90'



15000

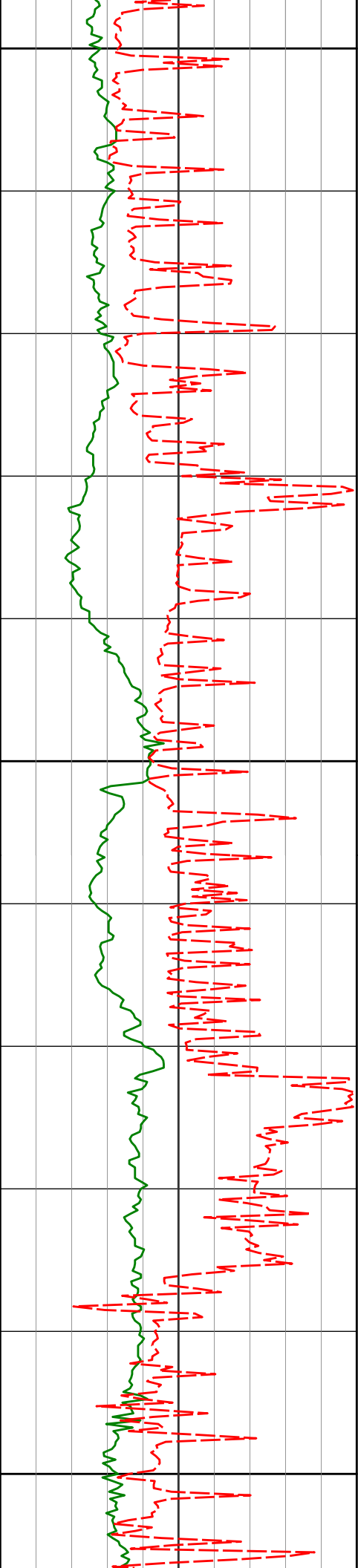
15100

15135'

88.80°

178.42° 7247.56'

8166.86'



15200

15300

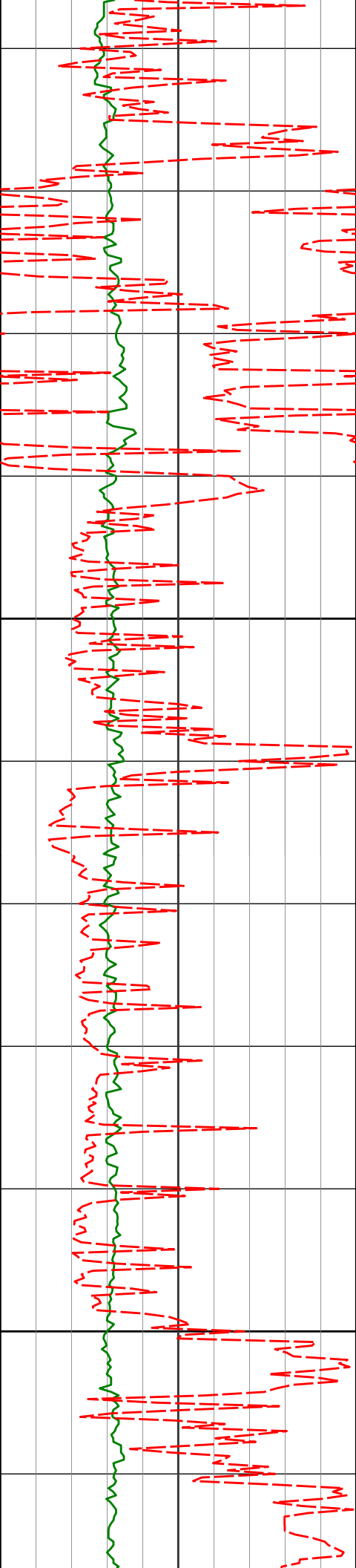
15400

15306'

89.38°

178.09° 7250.28'

8337.74'



15476'

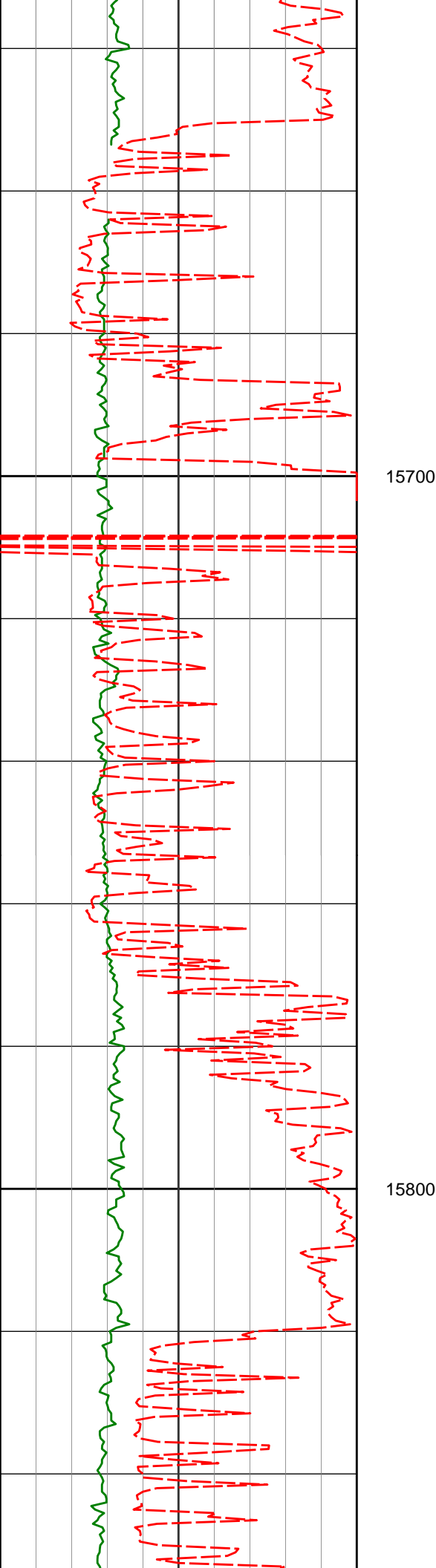
90.06°

177.92° 7251.11'

8507.60'

15500

15600



15647'

91.08°

180.17° 7249.40'

8678.54'

15700

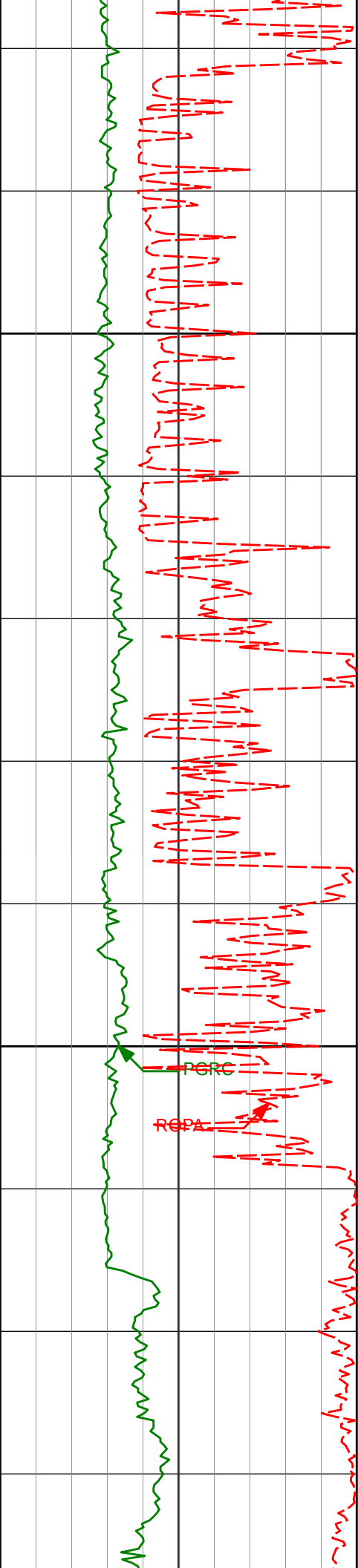
15800

15818'

90.03°

181.41° 7247.75'

8849.52'



15900

16000

15989'

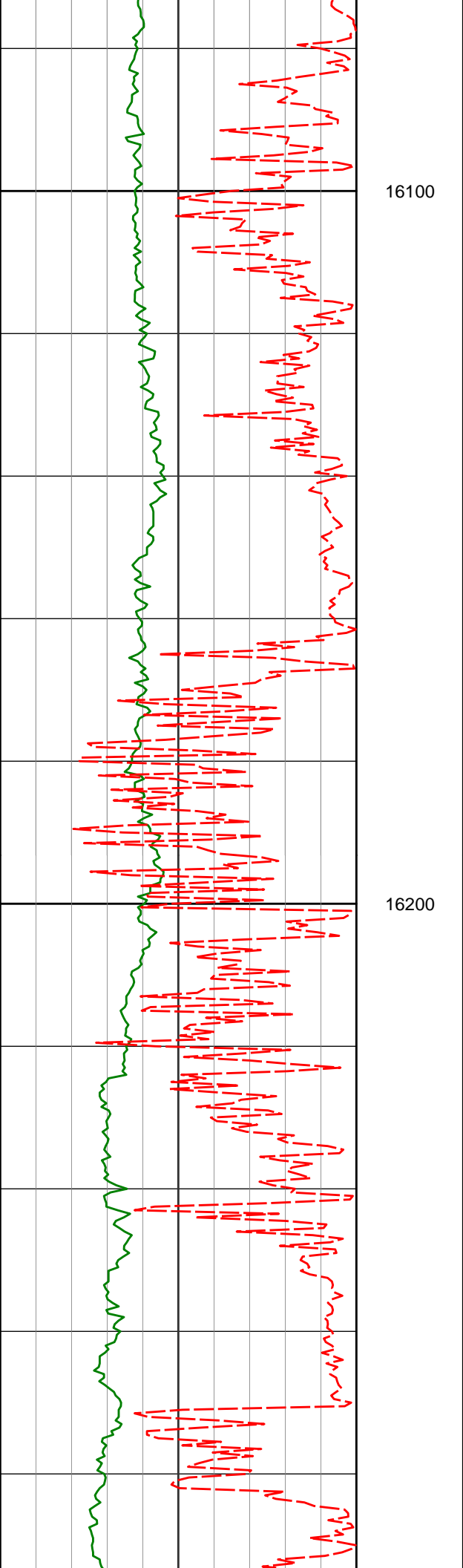
91.48°

181.60° 7245.50'

9020.46'

PERC

COP



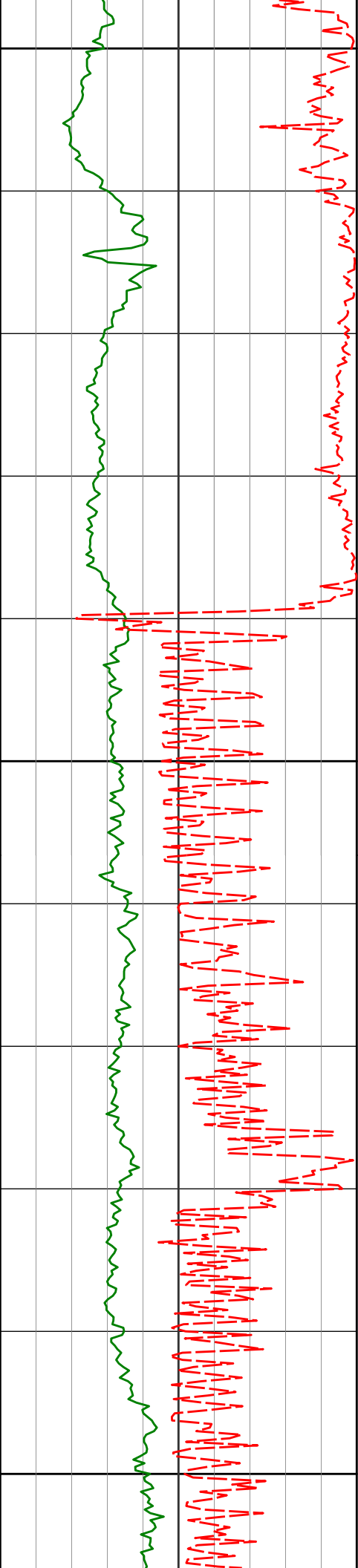
16160'

89.69°

182.12° 7243.75'

9191.38'





16300

16331'

88.49°

182.23° 7246.47'

9362.26'

16400

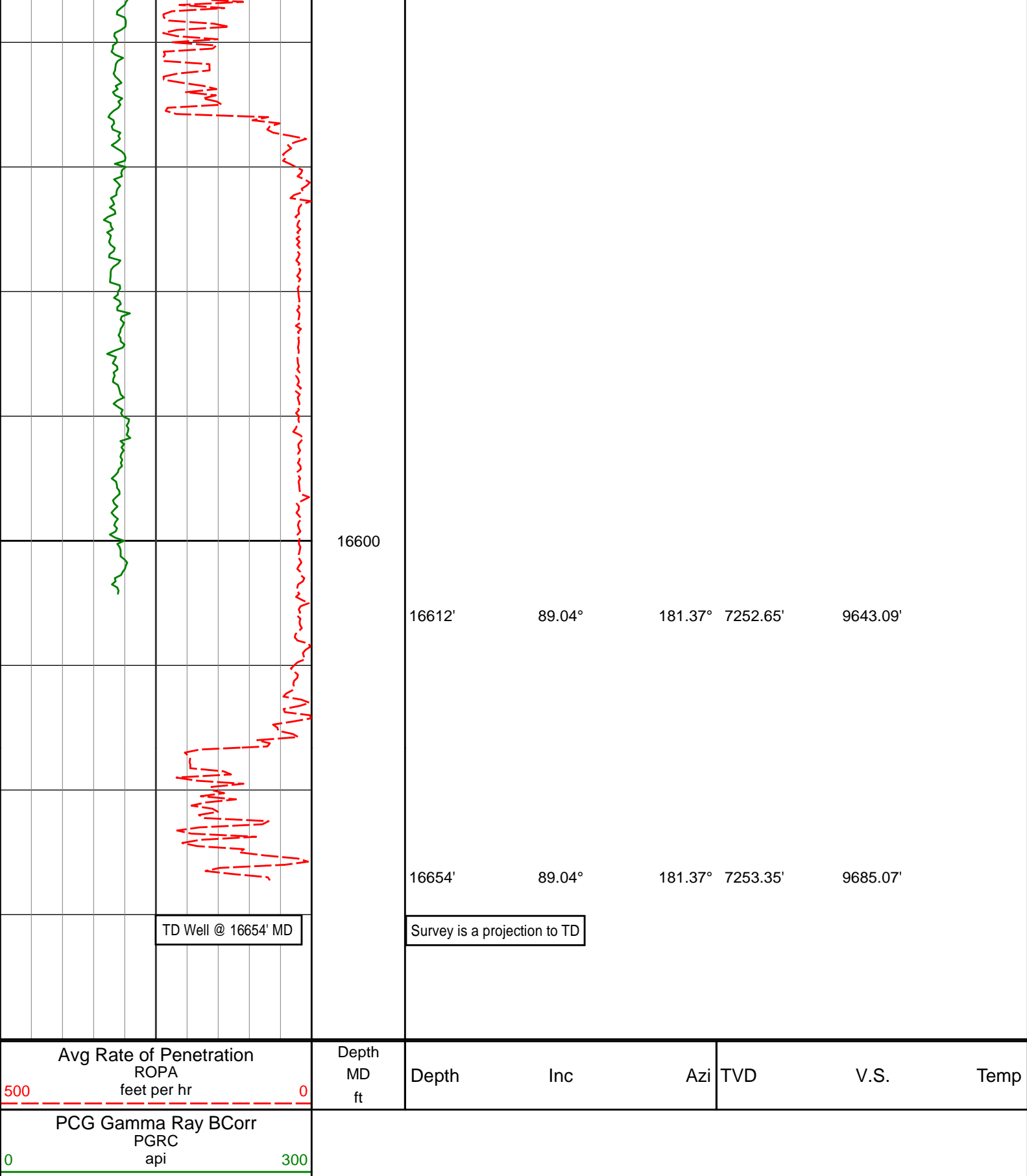
16500

16501'

88.77°

181.66° 7250.53'

9532.13'



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

**APC  
Gee 15N-25HZ**

982.00	0.82	234.32	981.95	7.47 S	5.28 W	7.49	TIE-IN
1106.00	0.91	247.57	1105.94	8.36 S	6.91 W	8.39	0.18
1296.00	0.44	168.95	1295.93	9.65 S	8.17 W	9.69	0.49
1485.00	0.62	265.93	1484.92	10.44 S	9.05 W	10.48	0.42
1670.00	1.08	286.91	1669.90	10.00 S	11.71 W	10.06	0.30
1853.00	0.53	319.47	1852.88	8.86 S	13.91 W	8.92	0.38
2036.00	1.02	289.22	2035.87	7.68 S	16.00 W	7.75	0.34
2219.00	1.24	263.59	2218.83	7.36 S	19.51 W	7.45	0.30
2402.00	1.82	166.26	2401.79	10.41 S	20.78 W	10.50	1.27
2586.00	1.98	170.69	2585.69	16.38 S	19.58 W	16.47	0.12
2769.00	0.90	213.04	2768.63	20.71 S	19.85 W	20.80	0.79
2952.00	0.85	227.08	2951.61	22.84 S	21.63 W	22.94	0.12
3136.00	3.07	270.19	3135.50	23.75 S	27.55 W	23.88	1.37
3318.00	5.90	275.13	3316.92	22.90 S	41.75 W	23.09	1.57
3489.00	5.72	265.68	3487.05	22.75 S	59.00 W	23.02	0.57
3660.00	9.04	274.09	3656.61	22.44 S	80.90 W	22.80	2.04
3831.00	9.68	273.09	3825.33	20.70 S	108.66 W	21.20	0.39
4003.00	10.74	271.61	3994.61	19.47 S	139.12 W	20.11	0.63
4174.00	9.62	273.22	4162.91	18.22 S	169.31 W	18.99	0.68
4345.00	10.59	272.93	4331.26	16.62 S	199.27 W	17.52	0.57
4516.00	10.25	272.76	4499.44	15.08 S	230.16 W	16.13	0.20
4687.00	10.21	265.90	4667.73	15.43 S	260.47 W	16.62	0.71
4857.00	10.55	267.46	4834.95	17.20 S	291.05 W	18.52	0.26
5029.00	11.26	271.12	5003.84	17.57 S	323.57 W	19.04	0.58
5200.00	10.54	271.67	5171.75	16.79 S	355.90 W	18.40	0.43
5371.00	10.83	266.62	5339.79	17.28 S	387.57 W	19.04	0.57
5542.00	11.17	272.04	5507.66	17.64 S	420.16 W	19.54	0.64
5713.00	8.88	274.56	5676.03	16.00 S	449.87 W	18.04	1.36
5970.00	7.24	265.68	5930.50	15.64 S	485.80 W	17.85	0.80
6141.00	5.54	262.04	6100.43	17.60 S	504.72 W	19.89	1.02
6311.00	4.20	261.71	6269.81	19.63 S	519.01 W	21.98	0.79
6480.00	1.40	279.00	6438.60	20.20 S	527.17 W	22.59	1.71
6609.00	0.57	243.78	6567.58	20.24 S	529.30 W	22.64	0.77
6651.00	2.11	174.78	6609.56	21.10 S	529.42 W	23.50	4.71
6694.00	7.24	179.76	6652.41	24.60 S	529.34 W	27.00	11.96
6737.00	12.33	176.27	6694.77	31.89 S	529.03 W	34.29	11.91
6780.00	14.94	177.78	6736.55	42.02 S	528.51 W	44.41	6.13
6823.00	17.12	177.71	6777.88	53.88 S	528.04 W	56.28	5.07
6866.00	19.33	176.81	6818.72	67.31 S	527.40 W	69.70	5.18
6908.00	20.75	176.82	6858.18	81.68 S	526.60 W	84.07	3.38
6951.00	22.11	177.78	6898.20	97.37 S	525.86 W	99.76	3.27
6993.00	28.17	179.35	6936.21	115.20 S	525.44 W	117.59	14.51
7036.00	33.67	182.38	6973.08	137.28 S	525.82 W	139.66	13.29
7078.00	41.44	180.32	7006.35	162.85 S	526.38 W	165.24	18.74
7121.00	47.43	178.38	7037.05	192.94 S	526.01 W	195.32	14.28
7164.00	52.52	178.30	7064.69	225.84 S	525.06 W	228.22	11.84
7207.00	56.60	177.81	7089.62	260.84 S	523.87 W	263.22	9.53
7249.00	60.43	178.12	7111.55	296.63 S	522.60 W	299.00	9.14
7292.00	64.35	177.78	7131.48	334.70 S	521.23 W	337.06	9.14
7334.00	67.50	176.39	7148.61	372.99 S	519.28 W	375.35	8.09
7377.00	69.63	176.85	7164.32	412.95 S	516.92 W	415.29	5.05
7418.00	73.02	176.73	7177.45	451.72 S	514.74 W	454.05	8.27
7461.00	76.25	177.80	7188.84	493.13 S	512.77 W	495.45	7.89
7509.00	82.30	178.05	7197.77	540.24 S	511.06 W	542.55	12.61
7616.00	88.24	179.06	7206.59	646.79 S	508.38 W	649.09	5.63
7787.00	89.88	181.05	7209.39	817.76 S	508.54 W	820.06	1.51
7958.00	91.29	181.22	7207.65	988.71 S	511.93 W	991.02	0.83
8130.00	91.73	180.79	7203.11	1160.62 S	514.95 W	1162.95	0.36
8301.00	89.48	180.96	7201.31	1331.58 S	517.56 W	1333.92	1.32
8472.00	88.71	180.55	7204.01	1502.54 S	519.81 W	1504.89	0.51
8644.00	88.67	181.03	7207.94	1674.48 S	522.18 W	1676.83	0.28
8814.00	90.00	180.87	7209.92	1844.44 S	525.00 W	1846.81	0.79
8985.00	90.74	180.34	7208.81	2015.43 S	526.80 W	2017.80	0.53
9155.00	89.45	180.79	7208.53	2185.42 S	528.48 W	2187.79	0.80

9326.00	88.00	180.76	7212.33	2356.35 S	530.79 W	2358.74	0.85
9497.00	88.49	180.82	7217.57	2527.26 S	533.15 W	2529.65	0.29
9668.00	89.20	180.45	7221.02	2698.21 S	535.04 W	2700.61	0.47
9839.00	89.85	180.35	7222.44	2869.20 S	536.24 W	2871.60	0.38
10010.00	88.80	180.51	7224.45	3040.18 S	537.52 W	3042.59	0.62
10181.00	89.54	180.82	7226.93	3211.15 S	539.51 W	3213.56	0.47
10352.00	88.30	181.32	7230.15	3382.08 S	542.70 W	3384.51	0.78
10523.00	89.14	180.93	7233.97	3553.01 S	546.05 W	3555.45	0.54
10694.00	90.06	180.66	7235.16	3723.98 S	548.43 W	3726.43	0.56
10865.00	89.51	180.22	7235.81	3894.98 S	549.74 W	3897.43	0.41
11036.00	90.03	179.75	7236.49	4065.97 S	549.69 W	4068.43	0.41
11207.00	88.52	178.81	7238.66	4236.94 S	547.55 W	4239.38	1.04
11378.00	89.32	178.62	7241.88	4407.87 S	543.71 W	4410.29	0.48
11549.00	89.08	179.68	7244.27	4578.83 S	541.18 W	4581.24	0.64
11720.00	88.43	180.79	7247.98	4749.78 S	541.88 W	4752.19	0.75
11891.00	89.32	180.44	7251.34	4920.74 S	543.71 W	4923.15	0.56
12062.00	90.03	180.37	7252.31	5091.73 S	544.92 W	5094.15	0.42
12233.00	90.65	180.28	7251.30	5262.72 S	545.89 W	5265.15	0.37
12405.00	90.37	181.17	7249.76	5434.70 S	548.07 W	5437.13	0.54
12574.00	90.06	180.93	7249.13	5603.67 S	551.16 W	5606.11	0.23
12745.00	89.45	181.44	7249.86	5774.63 S	554.70 W	5777.09	0.46
12915.00	89.45	180.93	7251.49	5944.59 S	558.21 W	5947.06	0.30
13086.00	90.00	180.46	7252.31	6115.57 S	560.29 W	6118.05	0.42
13254.00	91.14	179.84	7250.64	6283.56 S	560.73 W	6286.04	0.77
13425.00	91.11	180.71	7247.29	6454.52 S	561.55 W	6457.00	0.51
13596.00	89.88	180.52	7245.81	6625.50 S	563.38 W	6627.99	0.73
13768.00	89.60	179.94	7246.59	6797.50 S	564.07 W	6799.99	0.37
13939.00	90.52	179.62	7246.41	6968.49 S	563.42 W	6970.98	0.57
14110.00	90.49	179.83	7244.90	7139.49 S	562.60 W	7141.96	0.12
14282.00	89.63	179.35	7244.72	7311.48 S	561.37 W	7313.95	0.57
14452.00	90.55	179.19	7244.46	7481.46 S	559.20 W	7483.92	0.55
14621.00	89.72	180.31	7244.06	7650.46 S	558.46 W	7652.91	0.82
14792.00	89.51	180.67	7245.21	7821.45 S	559.93 W	7823.91	0.24
14963.00	90.06	180.33	7245.85	7992.44 S	561.42 W	7994.90	0.38
15135.00	88.80	178.42	7247.56	8164.41 S	559.54 W	8166.86	1.33
15306.00	89.38	178.09	7250.28	8335.31 S	554.33 W	8337.74	0.39
15476.00	90.06	177.92	7251.11	8505.20 S	548.42 W	8507.60	0.41
15647.00	91.08	180.17	7249.40	8676.15 S	545.57 W	8678.54	1.44
15818.00	90.03	181.41	7247.75	8847.12 S	547.92 W	8849.52	0.95
15989.00	91.48	181.60	7245.50	9018.05 S	552.41 W	9020.46	0.86
16160.00	89.69	182.12	7243.75	9188.94 S	557.96 W	9191.38	1.09
16331.00	88.49	182.23	7246.47	9359.79 S	564.45 W	9362.26	0.70
16501.00	88.77	181.66	7250.53	9529.64 S	570.22 W	9532.13	0.37
16612.00	89.04	181.37	7252.65	9640.58 S	573.16 W	9643.09	0.36
16654.00	89.04	181.37	7253.35	9682.57 S	574.16 W	9685.07	0.00

**CALCULATION BASED ON MINIMUM CURVATURE METHOD**

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT  
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD  
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 180.26 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.52 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16654.00 FEET  
IS 9699.58 FEET ALONG 183.39 DEGREES (TRUE)**

**Directional surveys tied onto Gyro's @ 982' MD. Final survey is a straight line projection to bit.**